RADIOLOGICAL SURVEY AND MONITORING
RADIOLOGICAL SOIL REMOVAL
AND SITE CLOSURE
160 EAST ILLINOIS STREET
CHICAGO, ILLINOIS

Prepared for:

Orange Blue, LLC
C/O Residential Homes of America, Inc.
100 N. Field Drive, Suite 360
Lake Forest, IL 60045

Prepared by:

GeoSyntec Consultants
55 West Wacker Drive, Suite 1100
Chicago, Illinois 60601

11 October 2005

EXECUTIVE SUMMARY

The subject site is located at 160 East Illinois Street, Chicago, Illinois, and was occupied by a six-story structure with one level of basement. That building has been demolished, removed from the site, and excavated down to the native sands present at a depth of approximately 8 feet below street grade.

Radiological surveys in the building prior to and during demolition found no materials in the building requiring removal as radiologically impacted. Radiological surveys of the basement floor and of the native sands beneath the floor slab and the column footings which were below the floor slab found no evidence of radiologically impacted materials that required removal within the footprint of the building. No material exhibiting evidence of contamination requiring disposal as radiologically impacted material was found anywhere on site. These surveys were also conducted by representatives from the U. S. EPA, who concurred with the findings.

Off-site soils outside the property line for the site will be required to be excavated as part of the construction. As a result, trenches were excavated through the fill soils down to the native sands and surveyed on the north, east, and south sides, outside of the building perimeter. Additionally, the pavement in a portion of the alley to the north and sidewalks out to the curb line on the east and south sides of the site were removed and surveyed.

Radiologically impacted soil was encountered in one small and one somewhat larger area under the pavement in the alley. The total quantity of material removed as radiologically impacted was estimated at approximately 8 cubic yards. Analysis of a sample of material from the location with the highest gamma readings showed activity levels of approximately 300 pCi/g total radium, based on Ac-228 as a surrogate for thorium.

The impacted soil was excavated, loaded into a container, and shipped off site for disposal. The locations in the alley previously found to exhibit radioactivity above the cleanup levels were re-surveyed and sampled and found to be below the cleanup levels. U.S. EPA also surveyed and sampled these locations and found no evidence of residual contamination above the specified cleanup levels.

No material exhibiting elevated radioactivity was found on the subject site. The only material encountered above the cleanup threshold specified by U.S. EPA was found off site beneath the pavement at two relatively small spots in the alley to the north. All material exhibiting radioactivity above the U.S. EPA specified cleanup

threshold of 7.1 pCi/g total radium has been removed from the site. The excavations and monitoring of those excavations extended down to the natural sands. No excavations or other construction activities related to this site, with the exception of utility corridor excavations in the adjacent rights-of-way, will disturb any soil that has not been previously surveyed and found to be clean, or such construction activity will be in natural sand, with no evidence of radiological contamination. At such time as the utility corridor locations are specified, those locations will be excavated and surveyed for potential radiological impacts, and the soil managed as appropriate.

TABLE OF CONTENTS

1. INTRODUCTION

The subject site is located at 160 East Illinois Street, at the northwest corner of Illinois Street and St. Clair Street, in Chicago, Illinois. The site formerly was occupied by a six-story structure with one level of basement. That building has been demolished and removed from the site. Following removal of the building, the basement floor slab and foundation, the site has been excavated down to the native sands present at a depth of approximately 8 feet below street grade.

The site is immediately adjacent to, south of and across an alley from a former industrial building, formerly occupied by Lindsay Light and Chemical Company. The Lindsay Light Building, to the north, was used for the manufacture of gas light mantles. That process utilized thorium compounds in the manufacturing process. Thorium is a radioactive element. Several properties in the vicinity have been found to be radiologically impacted apparently as a result of Lindsay Light activities.

When the subject site building was initially beginning demolition, the U.S. EPA requested the site be surveyed for radiological impacts. Additionally, the U.S. EPA requested that the demolition operations be monitored for radiological impacts in any fugitive dust from the site. Following the removal of the building and demolition debris, geotechnical engineering borings were drilled through the floor slab. The cuttings from these borings were screened for elevated radioactivity until the cuttings were apparently from natural soils. The basement floor was surveyed for elevated radioactivity, and upon removal of column foundation slabs beneath the floor slab, the underlying native sand soil was surveyed.

Outside the perimeter of the building and off the site proper, the pavement and sidewalks were removed to the center of the alley to the north and to the curb line to the east and south. Trenches were excavated through the fill soils to natural sand and monitored for radioactivity on the three sides of the site where such trenching was possible. Following that trenching and monitoring, the perimeter foundation walls were removed and the native sand soils beneath the foundation walls were surveyed.

This report presents the findings of those surveys, describes the removal that resulted from the identification of soil above the cleanup level established for the area, and documents the clean closure of the site in accordance with the procedures, methods and cleanup standards specified by U.S. EPA.

2. SCOPE OF WORK

2.1 Building Survey Prior to Completion of Demolition

The site demolition was begun January 31, 2005, prior to involvement by the U.S. EPA. At the request of U.S. EPA on February 11, 2005, the building was to be surveyed for elevated radioactivity before demolition progressed any farther. The floors of the building were cleared of debris and rubble and surveyed for elevated radioactivity. At the time of the building survey, a portion of the building, estimated at less than 20 percent, had been demolished or was too badly damaged to be safe to survey. The floors of the remainder of the building were surveyed in grids based on the building column lines, approximately 15 feet by 15 feet. The entire area of each grid was surveyed using a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. The grids were divided into quarters, and the highest reading in each quarter grid was recorded. Appendix A presents the results of the floor grid surveys.

In addition to the floors, the walls of the building were surveyed. The walls were surveyed from the floor to a height of approximately 6 feet above the floor. Readings were recorded for each approximately 7.5 feet length of the wall, approximately equal to the size of the floor survey grid recordings. The wall survey readings are also presented in Appendix A.

The readings found no areas of elevated radioactivity indicative of levels in need of remediation. A background value for the building could not readily be established due to the influence of the brick exterior of the building. The highest readings were correlated to the brick walls around the exterior of the building, where readings exceeded 20,000 CPM in several locations. These results were verbally reported to U.S. EPA.

During the survey of the building conducted February 16 and 17, 2005, GeoSyntec noted, documented and marked with spray paint two locations of elevated radioactivity on the floors where readings were somewhat above the surrounding floor readings, each approximately 6 to 12 inches in diameter: "spot 13600" on the 2nd floor, and "spot 12500" on the 6th floor, where readings were 13,600 and 12,500 CPM, respectively. On February 18, 2005, U.S. EPA Region 5 staff visited the building to conduct screening measurements and assess the two locations of elevated radioactivity found by GeoSyntec. U.S. EPA checked these spots with its Berkeley Nucleonics SAM 935 Portable Gamma Spectroscopy System (SAM). These findings are noted in SAM spectra 5 and 6 for "spot 13600" and SAM spectra 10 and 11 for "spot 12500", respectively. Since these spots were small in size and did not exceed U.S. EPA's

cleanup criteria for the Streeterville area, it was determined that these spots did not require remediation. The respective spectra are included in Appendix B.

In the course of the demolition, several large wood beams were salvaged from the debris. Those beams were transported to the demolition contractor's yard and staged there for subsequent screening. On February 25, 2005, the beams were frisked for elevated radioactivity and cleared. The beams were frisked using a Ludlum Model 2221 with an unshielded 2 x 2 NaI probe. Background readings were in the range of 7-10,000 CPM. No readings were above 13,000 CPM, which is well below the action level of 18,243 CPM indicative of the cleanup level of 7.1 pCi/g. USEPA also visited the contractor's yard, conducted their own survey, and concurred that the beams were cleared and could be released.

2.2 Survey of Cuttings from Soil Borings

Following removal of the majority of the demolition debris from the building basement, three geotechnical soil borings were drilled through the basement floor slab. The cuttings and soil samples recovered from the borings were surveyed for elevated radioactivity for the upper approximately 8 feet, until it was obvious from the cuttings and samples that the boring was advanced into natural sand. The surveys were conducted on the cuttings at the ground surface, and no down-hole surveys were conducted for this investigation. The cuttings were surveyed using a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. Readings ranged from 7,500 to nearly 11,000 CPM. The count rate indicative of a soil clean-up level of 7.1 pCi/g total radium is 18,243 CPM. The results of these surveys of the soil cuttings are included in Appendix C. These data show no results indicating radiologically impacted soils in these borings.

2.3 Basement Floor and Sub-Slab Soil Survey Readings

Following the completion of the demolition and removal of the demolition debris, the floor slab of the basement was surveyed for elevated radioactivity. In the course of the demolition and during the removal of the demolition debris, the basement floor slab was significantly broken-up. The survey was conducted using a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. The survey of the slab, prior to removal, found no areas of elevated radioactivity that could not be attributed to naturally occurring radioactivity in brick debris present in the basement or

adjacent brick walls. Values measured ranged from as low as 7,800 CPM in areas along the west edge where some foundation slabs remained adjacent to the hotel wall, to as high as 13,000 CPM. The general background appeared to be in the 10,000 to 11,000 CPM range. Data from this basement floor slab survey are presented in Appendix D.

Following the survey of the basement floor slab, as the slab was being removed, it was discovered that the majority of the basement was underlain by large, approximately 9-foot by 9-foot, 16-inch thick concrete slabs that formed the footings for the building columns. The slabs were found to overlie the natural sand soils. In consultation with U.S. EPA, it was agreed that upon removal of these slabs, the remaining pits would be surveyed to document the radiological character of the soil beneath the floor slab. The walls and floor of each pit from which a slab was removed was surveyed. As with the floor slab survey, the equipment used was a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. The survey of the native sand soil beneath the floor slab and the column footings found no areas of elevated radioactivity indicative of an exceedance of the cleanup criteria established by U.S. EPA. Similar to the floor slab readings, the readings generally ranged from 10,000 to 11,000 CPM, well below the threshold for clean-up of 18,243 CPM. The data from this sub-slab survey is included in Appendix D.

U.S. EPA visited the site during the completion of the basement floor slab survey and while the column foundation slabs were being removed. U.S. EPA conducted a verification survey of portions of the basement floor and participated in the initial surveys of the pits resulting from the removal of the column foundation slabs. The verification surveys conducted by U.S. EPA were consistent with the results reported herein.

2.4 Off-Site Excavation Monitoring

Off-site soils outside the property line for the site will be required to be excavated as part of the construction. No construction is proposed outside the property line; however, construction of forms for pouring concrete foundation elements such as grade beams at or near the property line will require soil in the adjacent right of way to be excavated. It was desired to complete all the survey and monitoring work prior to the beginning of construction, so as to avoid potentially interfering with the construction work. As a result, in order to survey this soil that would need to be excavated for the construction of the concrete forms, trenches were excavated through the fill soils down to the native sands and surveyed on the north, east and south sides, outside of the

building perimeter. Trenching and monitoring was conducted from 5 July through 10 July 2005. Additionally, the sidewalks out to the curb line on the east and south sides of the site were removed and the soil beneath the pavement was surveyed during this period.

The trenches that were excavated around the perimeter of the property were excavated with the basement foundation wall still in place. The soil was excavated using a back hoe in thin lifts, not exceeding 18 inches in thickness. The trench was surveyed using a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. The gamma count threshold indicative of material requiring removal as radiologically impacted was 18,243 CPM, equivalent to 7.1 pCi/g total radium.

The Health Physics technician entered the trench to perform the survey until the trench reached approximately 4 feet deep. After that depth, each bucket was surveyed to determine whether it exhibited evidence of elevated radioactivity. Excavation spoil that showed no evidence of elevated radioactivity was staged adjacent to the trench and after the trench was completed and cleared for backfilling, the excavated soil was used for backfill. The trenches extended to the base of the foundation wall and native sands at approximately 8 feet deep. The bottom reading in the trenches from a depth of 7.5 feet reflects the 18 inch interval from 7.5 to 9 feet deep. The readings for each lift at each approximately 7.5 feet of trench length were recorded. These data are presented in Appendix E.

The sidewalk pavement was removed as part of the exploration of the adjacent off-site perimeter of the site. The pavement slab and subgrade to a depth of approximately 6 to 12 inches was removed. The area was surveyed using a Ludlum Model 2221 Scaler Ratemeter with an unshielded 2 x 2 NaI detector. No detections above background levels in the 9,000 to 13,200 CPM range were detected. These are well below the action level of 18,243 CPM indicative of the 7.1 pCi/g cleanup threshold established by U.S. EPA for the site vicinity. These data are included in Appendix E.

2.5 Removal of Off-site Radiologically Impacted Soil

At two locations beneath the pavement in the alley, material exceeding the cleanup threshold was encountered. Radiologically impacted soil was encountered in one small area toward the western end of the alley adjacent to the north side of the site, and in one somewhat larger area at the east end of the alley off the northeast corner of the site. At the first location, the readings were only slightly above the threshold, with a

maximum of 30,500 CPM. At that location, the material was excavated by hand using a shovel, and approximately one to two cubic feet were loaded into a Supersack. After removal of that material, the area showed no evidence of elevated radioactivity.

At the second location, higher readings were noted. Within the alley, the pavement consisted of brick pavers underlain by an approximately 3-4 inch thick concrete slab. In the alley off the northeast corner of the site, readings in the range of 145,000 CPM were detected on top of the concrete slab. Upon removal of the slab readings on the order of 500,000 CPM were measured. The area exhibiting the elevated readings was limited to approximately 15 feet in length and was a narrow zone, perhaps 1 to 2 feet wide immediately adjacent to the foundation wall.

U.S. EPA representatives were present while the material was being exposed as the pavement slab was removed. They obtained a sample of the soil and provided split samples for analysis. One portion was retained by U.S. EPA, one sample was submitted for analysis by GeoSyntec, and one portion was analyzed by the Health Physics contractor at a field laboratory.

The material was excavated and loaded into approximately 1 cubic yard containers, Supersacks, for subsequent off-site shipping and disposal. A total of 10 Supersacks were loaded, totaling approximately 8 cubic yards. The impacted soil in the Supersacks was loaded into a shipping container, sealed, appropriate shipping documents were prepared by others, and the material was shipped off site for disposal at EnviroCare of Utah, a facility licensed to take these materials in Clive, Utah. A copy of the shipping manifest for the container is included in Appendix F.

2.6 Closure Verification

The off-site locations previously found to exhibit radioactivity above the cleanup levels were re-surveyed after the completion of the removal. The areas were then sampled, the samples run through the field laboratory, and found to be below the cleanup levels. Those data are included in summary of analytical data in Appendix G. At that time, the U.S. EPA was notified that the identified contamination had been removed. The U.S. EPA came to the site and also surveyed and sampled these locations and found no evidence of residual contamination above the specified cleanup levels. U.S. EPA authorized the backfilling based on the results of the field laboratory analysis and their own surveys of the property. Results of their verification sample analysis are included in Appendix G.

2.7 Radiological Analysis of Soil Sample

The sample provided to GeoSyntec was submitted for high resolution gamma spectroscopy analysis by Radiation Safety Services, Inc., (RSSI) of Morton Grove, Illinois. Using Ac-228, at 296 pCi/g, as a surrogate for Ra-228 and Pb-214, at 1.6 pCi/g, as a surrogate for Ra-226 total radium (Ra-226 + Ra-228) of 297.6 pCi/g is obtained. The analytical report from RSSI is included in Appendix G.

The field laboratory analysis was conducted using NUTRANL methodology and detected approximately 500 pCi/g. However, results were not recorded for that analysis.

Results of analyses by U.S. EPA are included in Appendix G. These data document total radium in the samples recovered from the off-site location at 360 and 371 pCi/g in duplicate samples. These are in general agreement with the RSSI results, considering the ingrowth of daughter progeny with time in the U.S. EPA sample, and with the NUTRANL results which tend to be conservative (over predict) due to the screening nature of the methodology.

2.8 Site Perimeter Air Quality Monitoring

During the building demolition, U.S. EPA requested the site perimeter be monitored for potential radiological impacts to dust from the site. Four high volume samplers were stationed at the site margins. In that the exterior walls remained in place for the majority of the demolition along the north and south margins of the site, the Intercontinental Hotel occupies the western site margin, and the debris loading was conducted at the east end of the site, the air monitoring was concentrated on the open eastern side of the site.

Sampling pumps were positioned at the southeast corner of the site on both the upper and lower levels of Illinois Street. One sampling pump was positioned near the northeast corner of the site at the alley. One sampling pump was positioned near the middle of the east side on the site perimeter fence. The demolition equipment and truck loading resulted in having to close St. Clair Street. As a result, the operating perimeter and site fence were on the east side of the street, and the air monitoring location for the east side of the site was also on the east side of St. Clair Street.

The samples were generally collected each day during the entire time demolition and debris loading operations were conducted. Per agreement with U.S. EPA, sampling was not required during times of rain, as dust suppression was not generally a problem, and sampling during rain events can be detrimental to the sampling equipment.

The samples were read for elevated radioactivity one day after sampling and four days after sampling. The four-day results were used to compare to regulatory limits as these allow for the decay of short-lived decay progeny. No readings above the regulatory limits were detected in the air monitoring results from the site. The air emission criterion is 4 x 10E-15 uCi/ml Th-232. The minimum detectable concentration and air monitoring data are presented in Appendix H.

3. CONCLUSIONS

The data from the building survey show no evidence of elevated radioactivity in the building prior to demolition. Surveys of cuttings from soil borings beneath the floor slab including several feet of penetration into natural sand showed no readings indicative of radiologically impacted material. Radiation surveys of the basement floor slab and the soil beneath the slab find no evidence of elevated radioactivity within the building footprint. No material exhibiting elevated radioactivity was found on the subject site.

Air sampling results found no evidence of radiologically impacted dust from the demolition activities.

The only material encountered above the cleanup threshold specified by U.S. EPA was found off site beneath the pavement at two relatively small spots in the alley to the north. All material exhibiting radioactivity above the U.S. EPA specified cleanup threshold of 7.1 pCi/g total radium has been removed from the site. The excavations and monitoring of those excavations extended down to the natural sands.

U.S. EPA was present or visited the site in the course of the work completed. They conducted their own verification surveys for the work documented in this report, and their results agreed with the findings reported herein.

No excavations or other construction activities related to this site, with the exception of utility corridor excavations in the adjacent rights-of-way, will disturb any soil that has not been previously surveyed and found to be clean, or such construction activity will be in natural sand, with no evidence of radiological contamination. At such time as the utility corridor locations are specified, those locations will be excavated and surveyed for potential radiological impacts, and the soil managed as appropriate. A supplemental letter report will be prepared and submitted to address the survey work in the utility corridors, upon completion of that work.

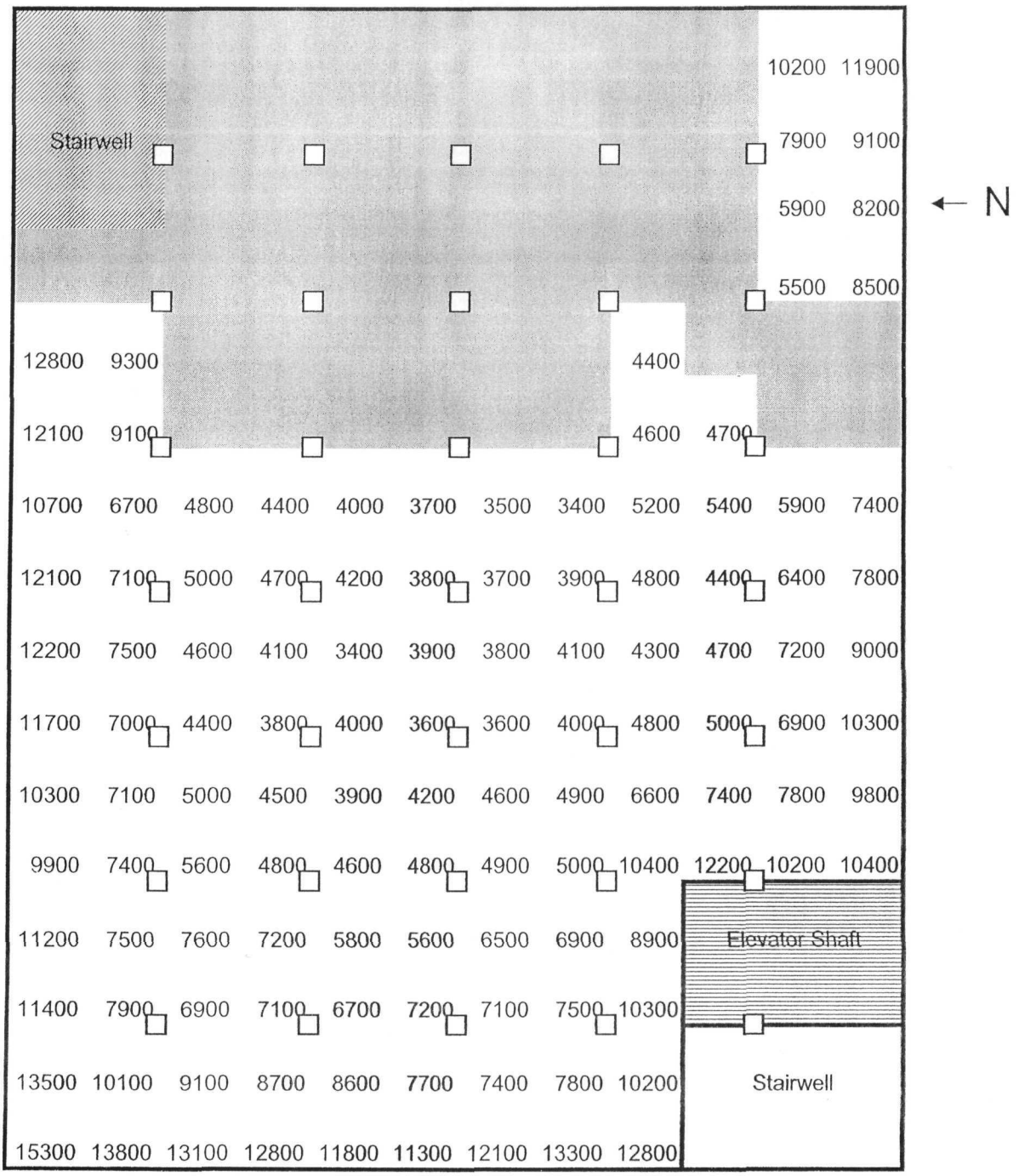
APPENDIX A

Building Survey Results

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

1st Floor



= Danger: Inaccessable Area

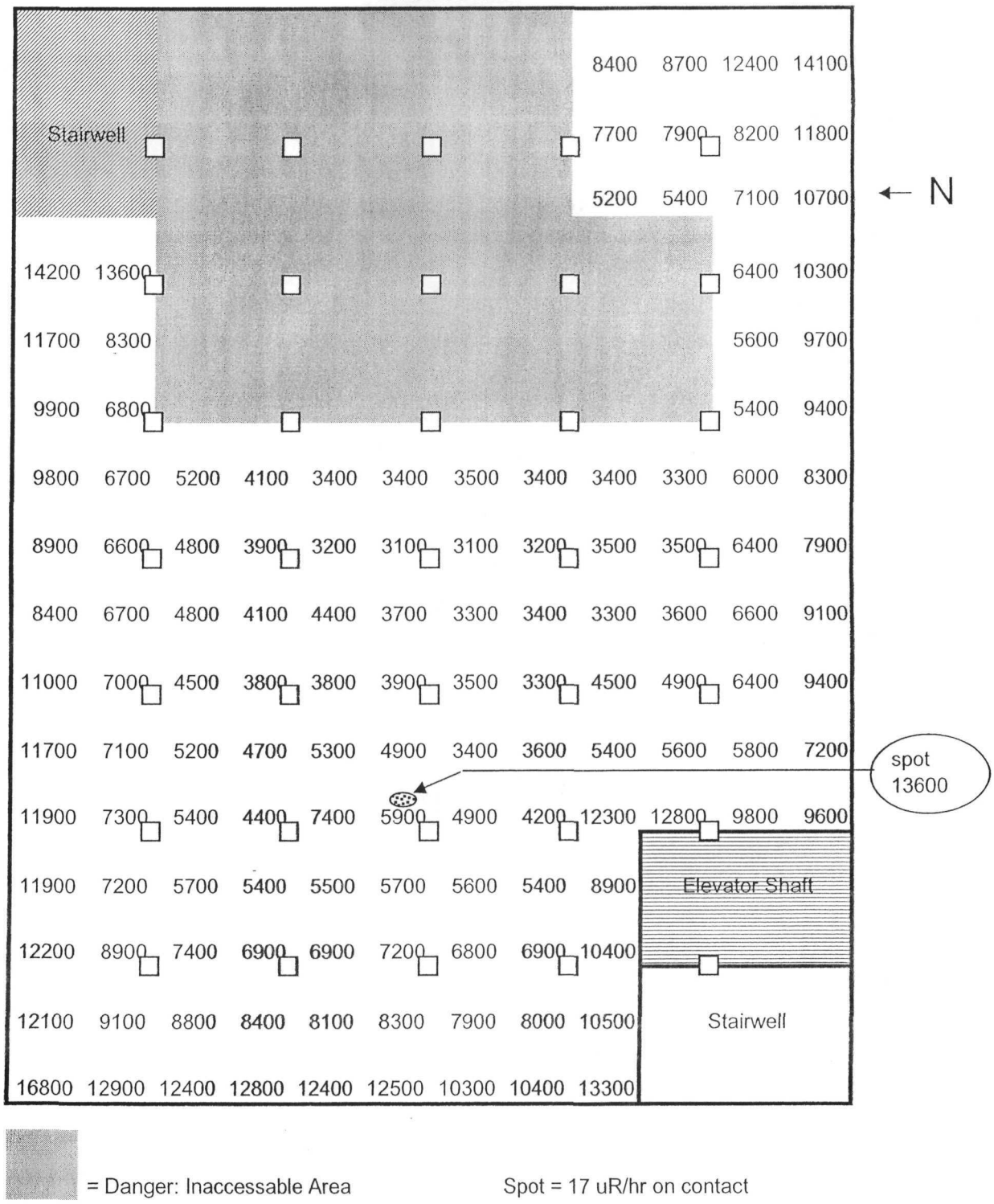
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

2nd Floor



= Danger: Inaccessable Area

Spot = 17 uR/hr on contact

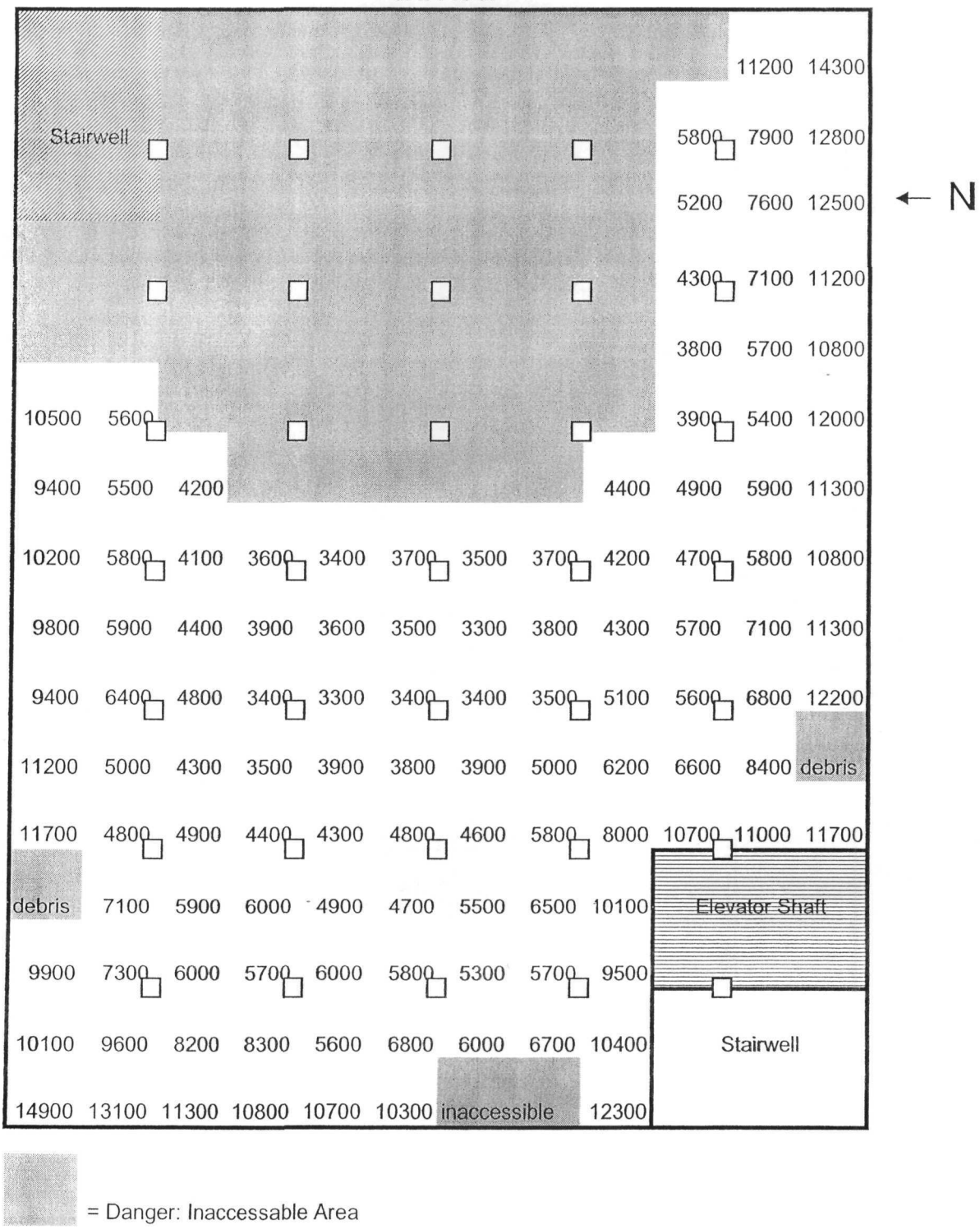
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

3rd Floor



= Danger: Inaccessable Area

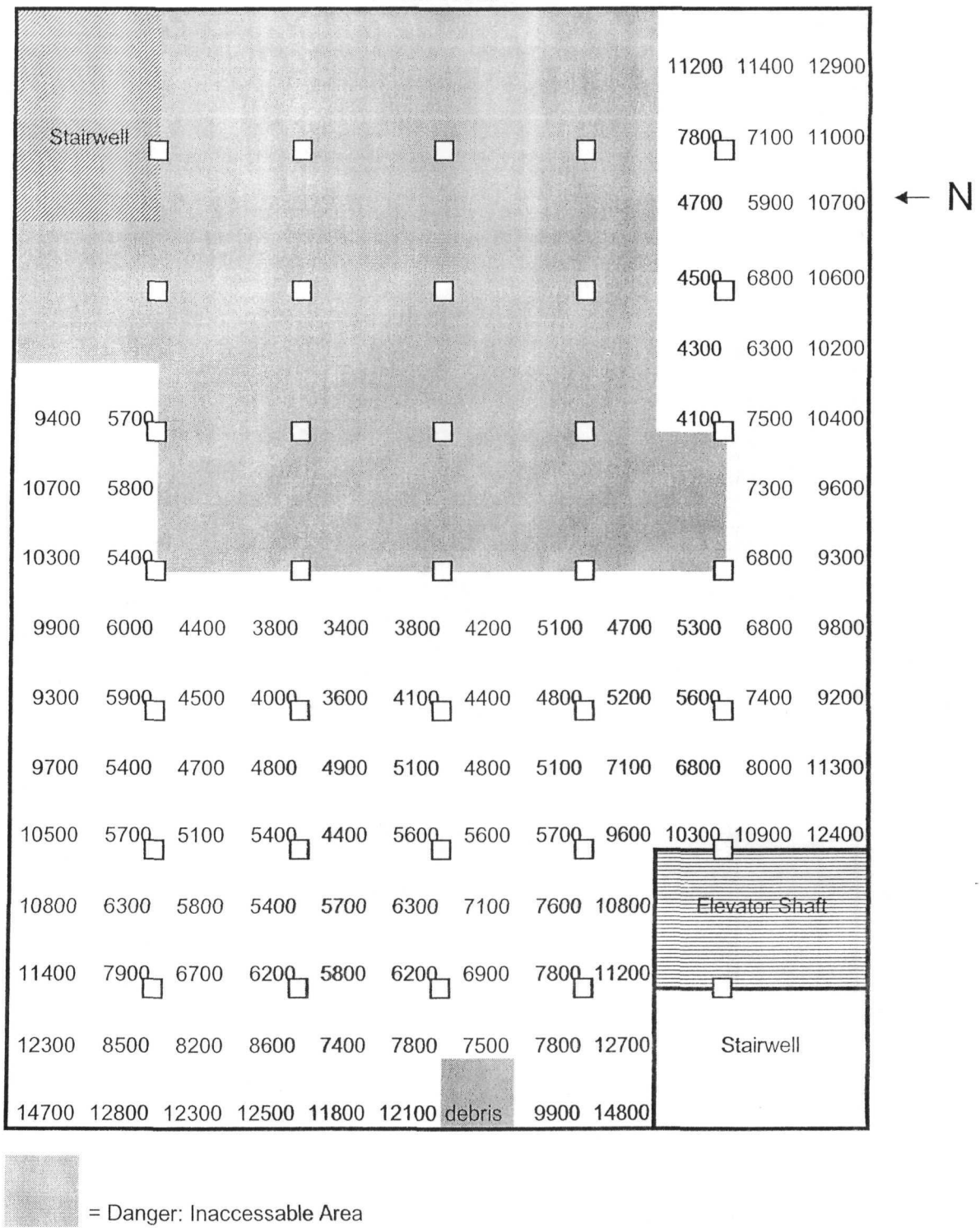
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

4th Floor



= Danger: Inaccessable Area

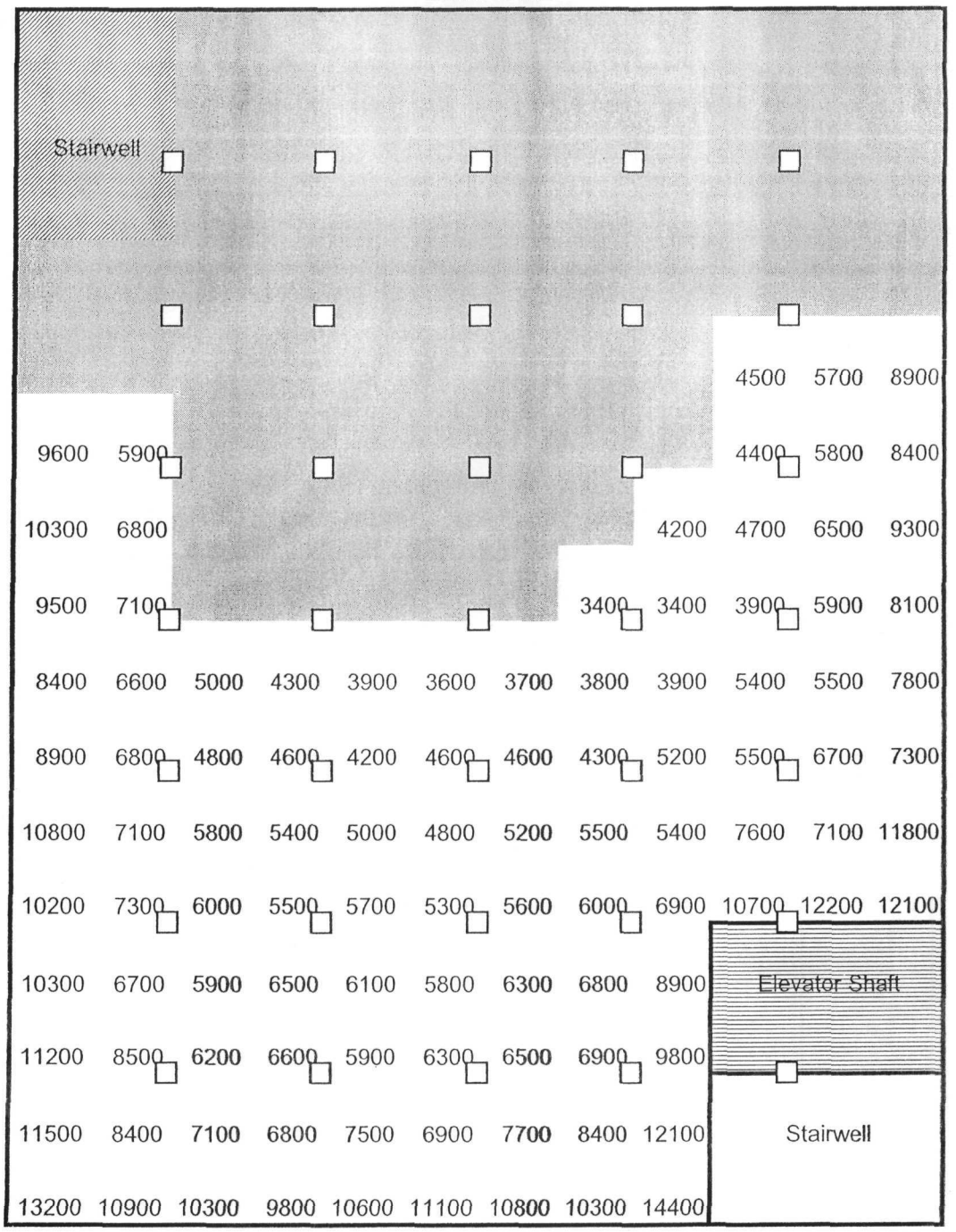
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

5th Floor



= Danger: Inaccessable Area

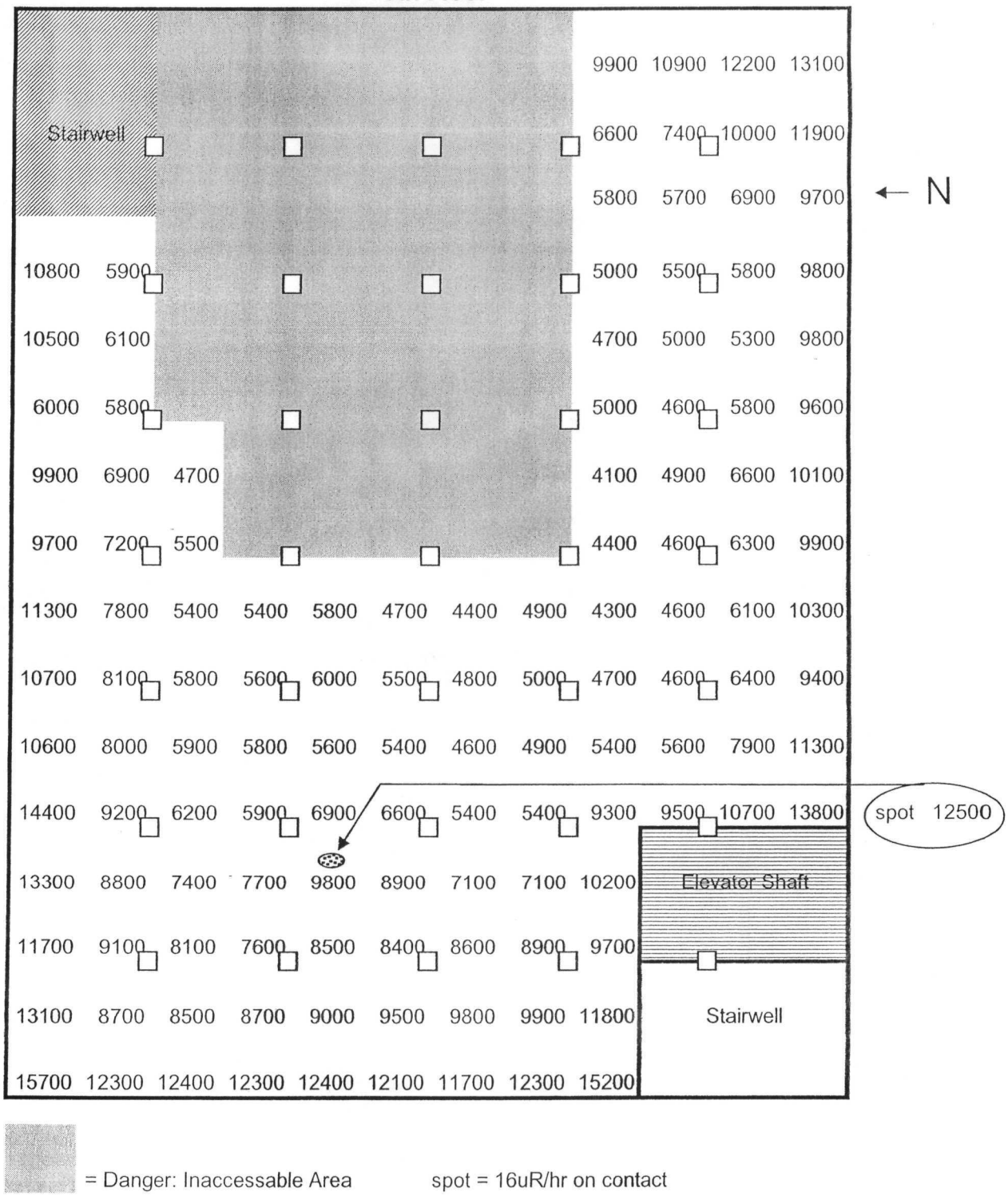
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

6th Floor



= Danger: Inaccessable Area

spot = 16uR/hr on contact

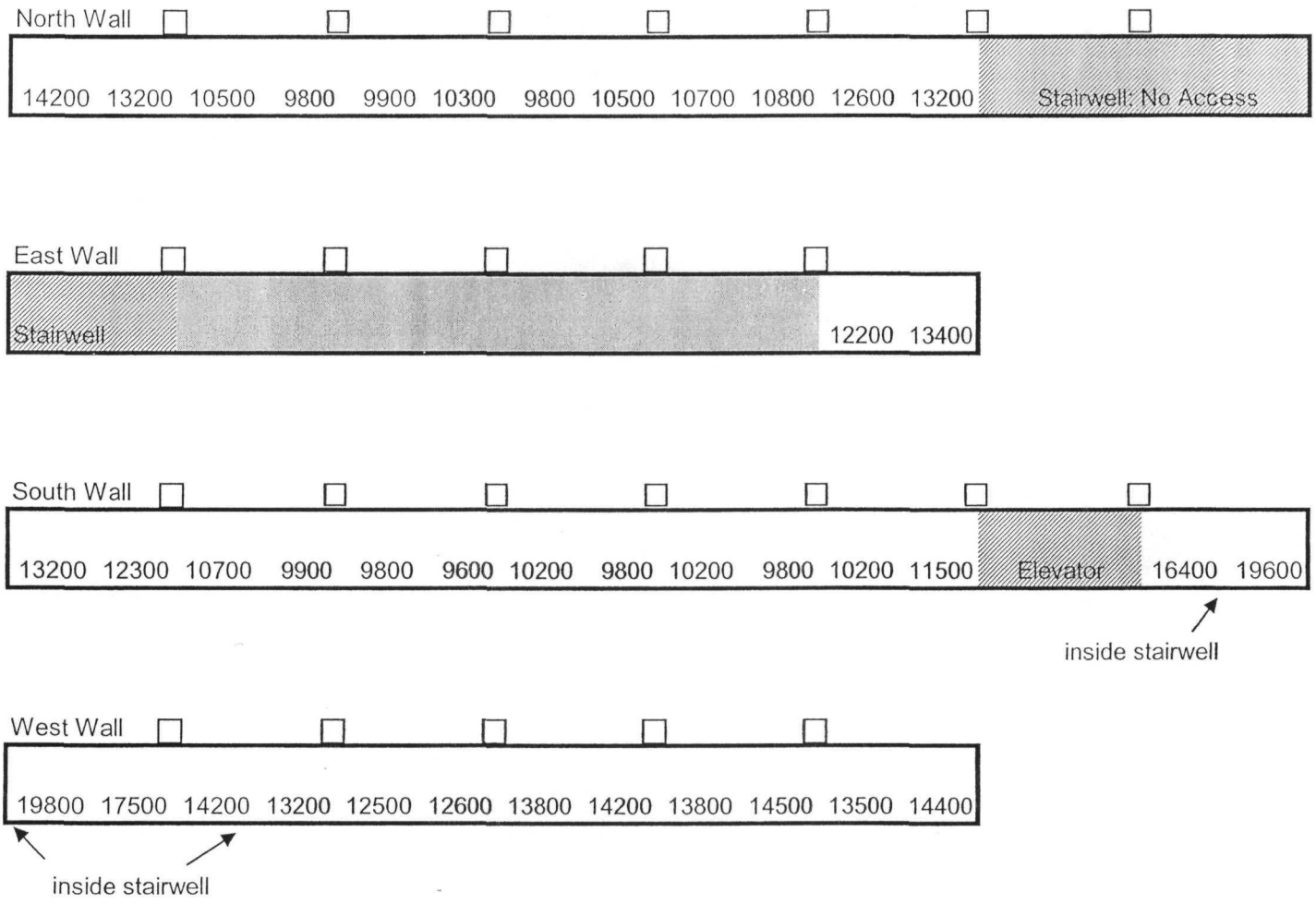
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

1st Floor Walls



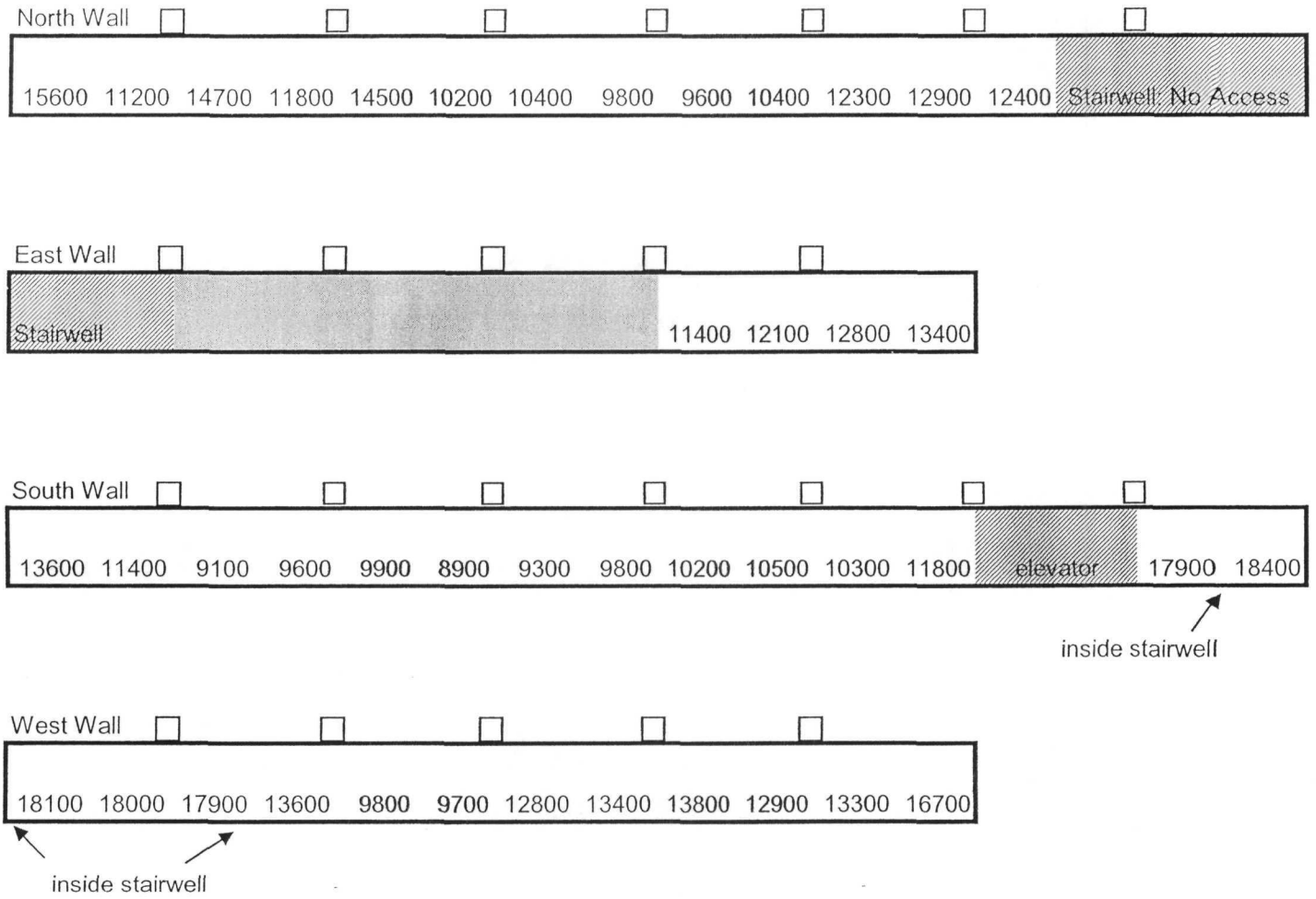
= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)
All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

2nd Floor Walls



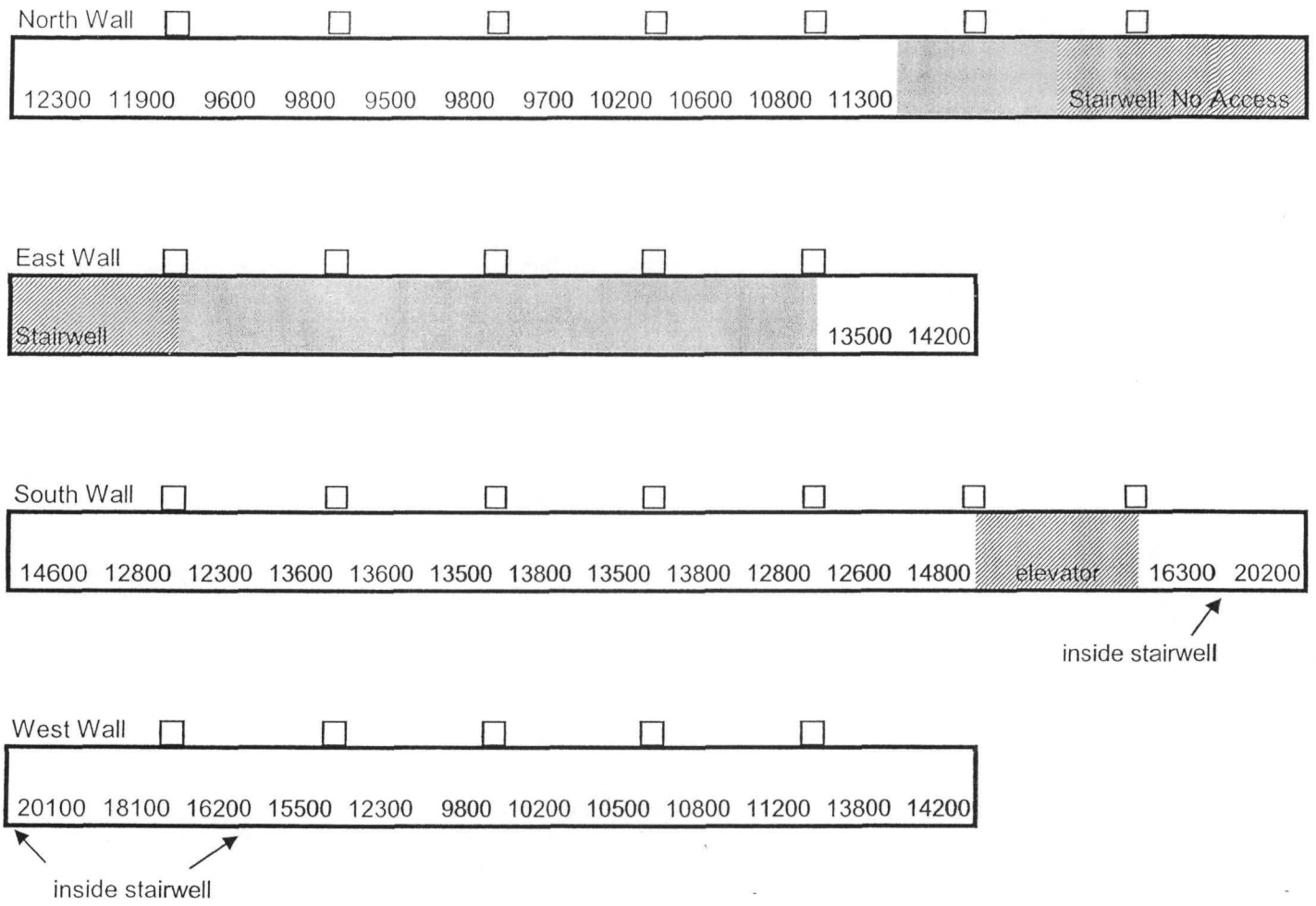
= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)
All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

3rd Floor Walls



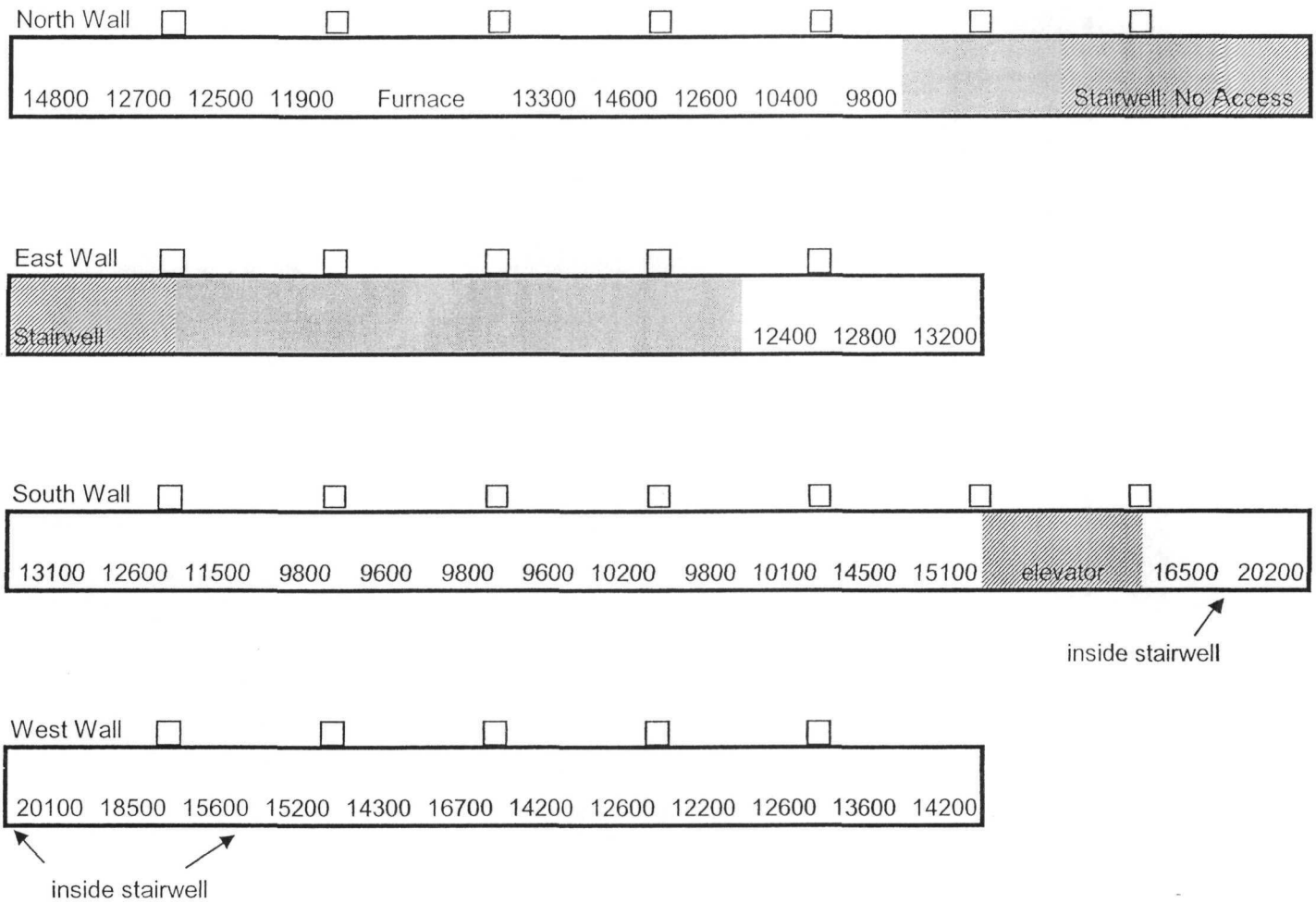
= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)
All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

4th Floor Walls



= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right

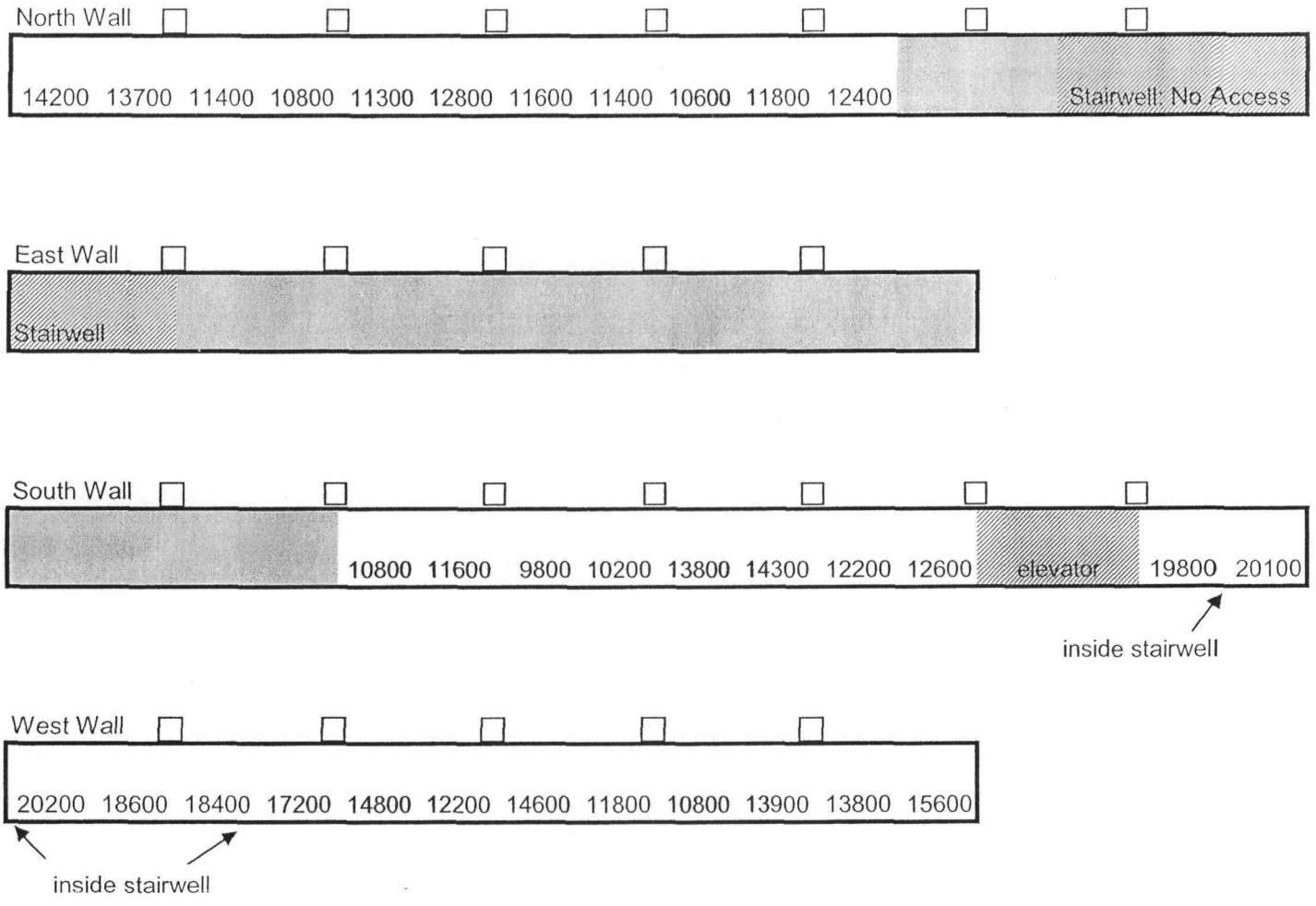
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

5th Floor Walls



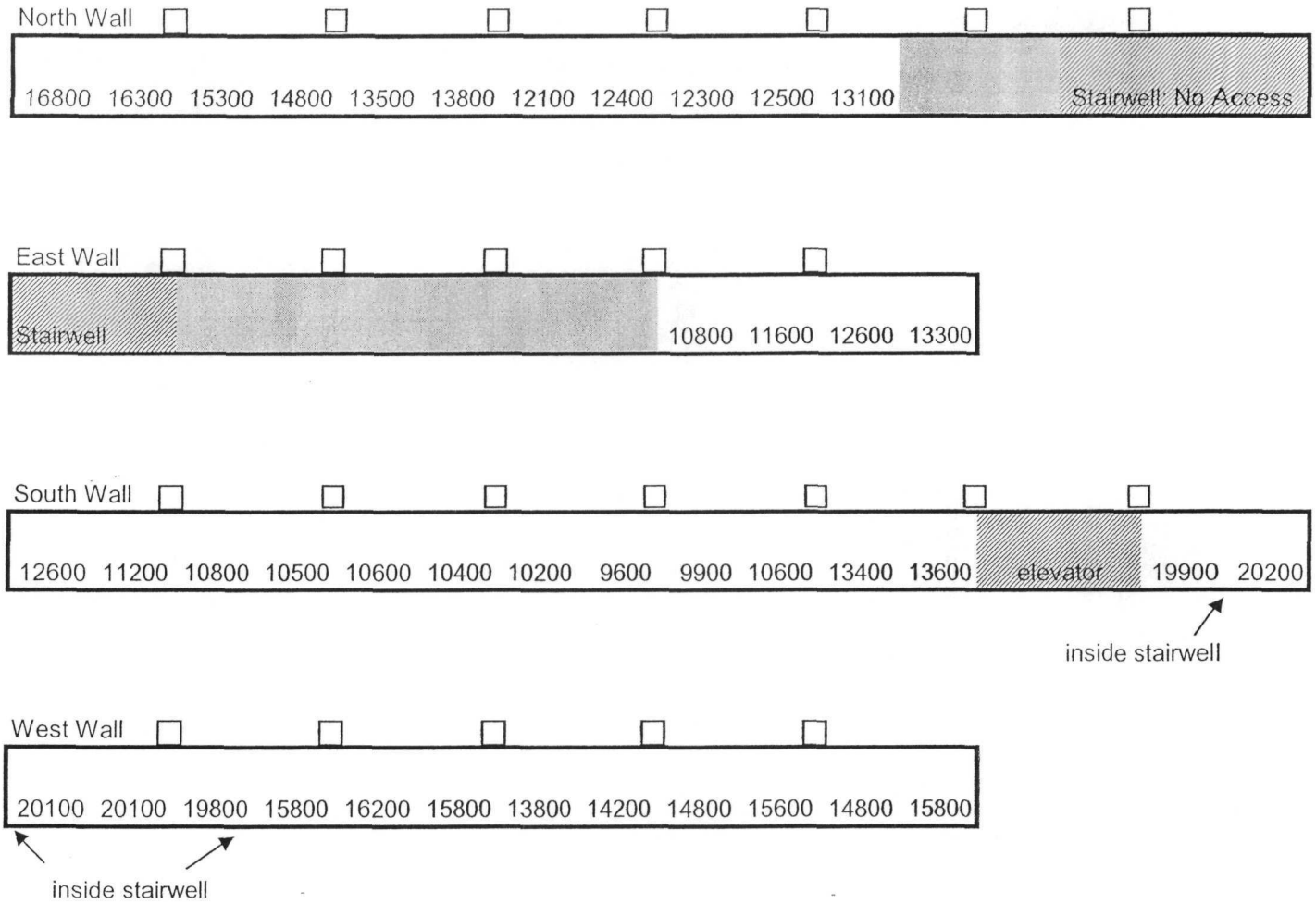
= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right
Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542 & SN 127242)
All Results in Counts Per Minute (CPM)

GeoSyntec Consultants
160 E. Illinois Street Survey

February 16 - 17, 2005
Glenn Huber & Tim O'Brien

6th Floor Walls



= Danger: Inaccessable Area

Note: Each wall count is recorded as if you are facing the direction of the wall, left to right

Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in Counts Per Minute (CPM)

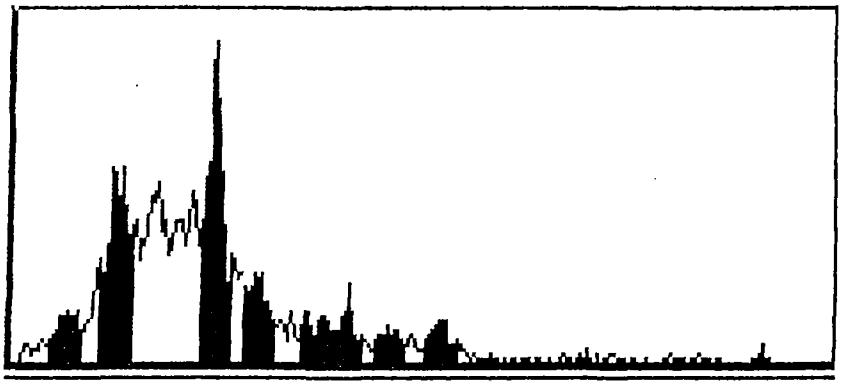
APPENDIX B

U.S. EPA Berkeley Nucleonics SAM 935 Portable Gamma Spectroscopy System Analytical Results

MCA REPORT

		SAVED AS: Spectrum # 5	
DATE:	18-Feb-2005 11:45	BIAS:	742
EN CAL DATE:	18-Feb-2005 11:36	COARSE GAIN:	1
		FINE GAIN:	1.34
BKG DATE:	18-Feb-2005 11:36	LOW DISC:	0.41%
GROSS CPM:	15358	HIGH DISC:	100.05%
NET CPM:	10617	ELAPSED LT:	78.93
GROSS INTEGRAL:	20204	ELAPSED RT:	79.38
NET INTEGRAL:	13967	DEAD TIME:	0.57%

FULL SCALE: 424



PEAKS FOUND

CHN	ENERGY (keV)	GROSS CPM	AMBIENT CPM	CONTINUUM CPM	NET CPM		UNC %	
17	37.7	675	218	309	147	q	18.3	
32	85.2	2625	1045	1182	396	q	13.9	Pb212
62	241.0	2517	508	1229	779	q	6.31	Pb212
77	343.3	1049	289	647	112	q	29.3	Th232
95	495.0	592	145	334	111	q	21.9	
105	597.0	631	127	346	157	q	15.7	Th232
118	734.9	364	54	183	125	q	14.5	
134	921.5	402	48	179	174	q	10.8	
179	1576.9	95	16	28	49	q	19.1	
233	2580.1	70	4	20	45	q	16.7	

2 OF 2 LIBRARY LINES FOR Pb212 FOUND Correlation = 0.88

LINE	PEAK	INTENSITY	NET CPM
78.7	84.1	35.70	396
238.6	241.6	43.30	779

1 OF 1 LIBRARY LINES FOR Ra224 FOUND Correlation = 0.80

LINE	PEAK	INTENSITY	NET CPM
241.0	241.6	3.97	779

4 OF 4 LIBRARY LINES FOR Th232 FOUND Correlation = 0.73

LINE	PEAK	INTENSITY	NET CPM
86.0	84.1	14.00	396
238.6	241.6	15.00	779

347.0	344.2	4.00	112
590.0	592.9	3.20	157

NUCLIDES NOT PRESENT:

2 OF 3	LIBRARY LINES FOR	Bi212	FOUND	Correlation =	0.55
1 OF 2	LIBRARY LINES FOR	Bi214	FOUND	Correlation =	0.45
2 OF 5	LIBRARY LINES FOR	Tl208	FOUND	Correlation =	0.37
3 OF 9	LIBRARY LINES FOR	Ac228	FOUND	Correlation =	0.29
1 OF 3	LIBRARY LINES FOR	Ra226	FOUND	Correlation =	0.16
3 OF 5	LIBRARY LINES FOR	Pb214	FOUND	Correlation =	0.12
0 OF 1	LIBRARY LINES FOR	Am241	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Cs137	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	K40	FOUND	Correlation =	0.00
0 OF 0	LIBRARY LINES FOR	Name	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Pb210	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Pu239	FOUND	Correlation =	0.00
0 OF 2	LIBRARY LINES FOR	U235	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	U238	FOUND	Correlation =	0.00

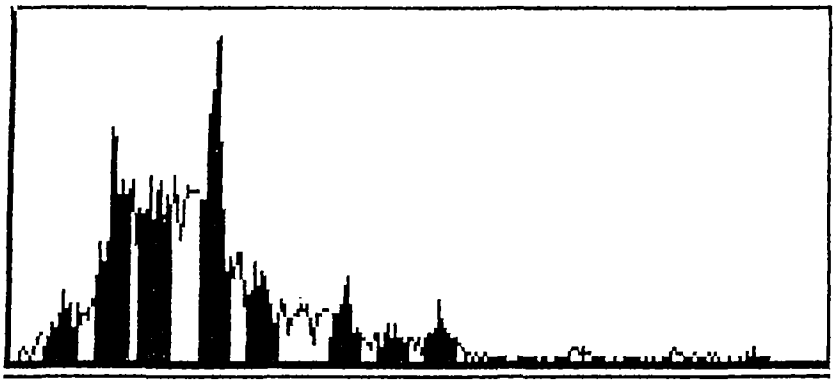
LINES NOT ASSOCIATED WITH ANY NUCLIDE:

Energy	Net CPM	Eff Corrected	
36.1	147.5	4791.1	C
493.6	111.7	8100.5	C
738.9	125.4	18432.4	C
928.6	174.8	39088.2	C
1579.3	49.4	13368.1	C
2582.3	45.6	5764.7	C

MCA REPORT

		SAVED AS: Spectrum # 6	
DATE:	18-Feb-2005 11:47	BIAS:	742
EN CAL DATE:	18-Feb-2005 11:36	COARSE GAIN:	1
		FINE GAIN:	1.34
BKG DATE:	18-Feb-2005 11:36	LOW DISC:	0.41%
GROSS CPM:	15527	HIGH DISC:	100.05%
NET CPM:	10786	ELAPSED LT:	65.28
GROSS INTEGRAL:	16894	ELAPSED RT:	65.43
NET INTEGRAL:	11735	DEAD TIME:	0.23%

FULL SCALE: 329



PEAKS FOUND

CHN	ENERGY (keV)	GROSS CPM	AMBIENT CPM	CONTINUUM CPM	NET CPM	UNC %	
17	37.4	625	189	318	117 *q*	23.5	
31	82.5	2588	999	1268	319 *q*	18.2	Pb212
42	131.0	2534	984	1379	170 *q*	33.9	
62	242.7	2495	509	1314	671 *q*	7.88	Pb212
76	340.4	955	273	596	85 *q*	39.7	Th232
105	593.7	633	127	358	147 *q*	18.1	Th232
120	750.5	321	53	247	21 *q*	88.4	
134	924.6	382	48	171	161 *q*	12.4	
233	2568.5	69	4	4	60 *q*	13.7	

2 OF 2 LIBRARY LINES FOR Pb212 FOUND Correlation = 0.87

LINE	PEAK	INTENSITY	NET CPM
78.7	82.5	35.70	319
238.6	242.8	43.30	671

1 OF 1 LIBRARY LINES FOR Ra224 FOUND Correlation = 0.80

LINE	PEAK	INTENSITY	NET CPM
241.0	242.8	3.97	671

4 OF 4 LIBRARY LINES FOR Th232 FOUND Correlation = 0.70

LINE	PEAK	INTENSITY	NET CPM
86.0	82.5	14.00	319
238.6	242.8	15.00	671
347.0	348.5	4.00	85

590.0	588.3	3.20	147

NUCLIDES NOT PRESENT:

1 OF 3	LIBRARY LINES FOR	Bi212	FOUND	Correlation =	0.31
3 OF 9	LIBRARY LINES FOR	Ac228	FOUND	Correlation =	0.30
1 OF 5	LIBRARY LINES FOR	Tl208	FOUND	Correlation =	0.18
3 OF 5	LIBRARY LINES FOR	Pb214	FOUND	Correlation =	0.11
0 OF 1	LIBRARY LINES FOR	Am241	FOUND	Correlation =	0.00
0 OF 2	LIBRARY LINES FOR	Bi214	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Cs137	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	K40	FOUND	Correlation =	0.00
0 OF 0	LIBRARY LINES FOR	Name	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Pb210	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	Pu239	FOUND	Correlation =	0.00
0 OF 3	LIBRARY LINES FOR	Ra226	FOUND	Correlation =	0.00
0 OF 2	LIBRARY LINES FOR	U235	FOUND	Correlation =	0.00
0 OF 1	LIBRARY LINES FOR	U238	FOUND	Correlation =	0.00

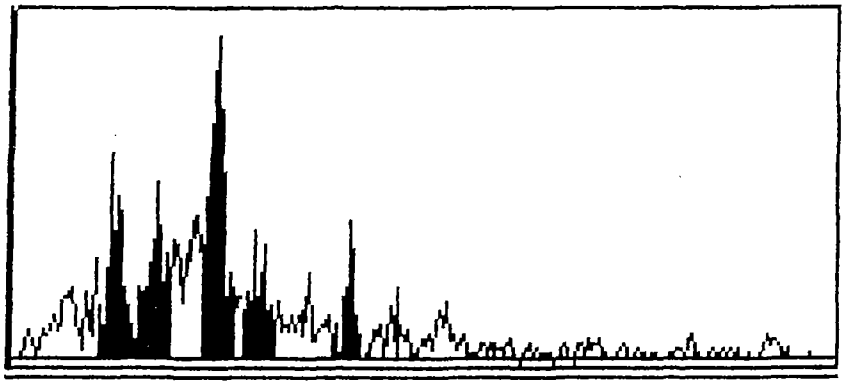
LINES NOT ASSOCIATED WITH ANY NUCLIDE:

Energy	Net CPM	Eff	Corrected
35.0	117.6	3853.7	C
136.4	170.0	3802.3	C
747.8	21.1	3233.7	C
926.4	161.8	36372.5	C
2567.7	60.7	7720.3	C

MCA REPORT

		SAVED AS:	Spectrum # 10
DATE:	18-Feb-2005 11:59	BIAS:	742
EN CAL DATE:	18-Feb-2005 11:36	COARSE GAIN:	1
		FINE GAIN:	1.34
BKG DATE:	18-Feb-2005 11:36	LOW DISC:	0.41%
GROSS CPM:	12380	HIGH DISC:	100.05%
NET CPM:	7639	ELAPSED LT:	13.56
GROSS INTEGRAL:	2798	ELAPSED RT:	13.64
NET INTEGRAL:	1726	DEAD TIME:	0.59%

FULL SCALE: 63



PEAKS FOUND

CHN	ENERGY (keV)	GROSS CPM	AMBIENT CPM	CONTINUUM CPM	NET CPM	UNC %	
31	84.4	2008	1044	389	575 *q*	17.3	Pb212
42	128.5	1858	982	460	415 *q*	23.1	
63	249.0	2053	473	752	827 *q*	11.8	Pb212
76	339.2	898	287	460	150 *q*	43.4	
105	592.1	592	115	22	455 *q*	11.5	

2 OF 2 LIBRARY LINES FOR Pb212 FOUND Correlation = 0.94

LINE	PEAK	INTENSITY	NET CPM
78.7	82.8	35.70	575
238.6	246.5	43.30	827

1 OF 1 LIBRARY LINES FOR Ra224 FOUND Correlation = 0.80

LINE	PEAK	INTENSITY	NET CPM
241.0	246.5	3.97	827

NUCLIDES NOT PRESENT:

1 OF 2 LIBRARY LINES FOR Bi214 FOUND Correlation = 0.45
4 OF 4 LIBRARY LINES FOR Th232 FOUND Correlation = 0.41
1 OF 5 LIBRARY LINES FOR T1208 FOUND Correlation = 0.18
1 OF 3 LIBRARY LINES FOR Ra226 FOUND Correlation = 0.16
3 OF 5 LIBRARY LINES FOR Pb214 FOUND Correlation = 0.15
2 OF 9 LIBRARY LINES FOR Ac228 FOUND Correlation = 0.01
0 OF 1 LIBRARY LINES FOR Am241 FOUND Correlation = 0.00
0 OF 3 LIBRARY LINES FOR Bi212 FOUND Correlation = 0.00

0 OF 1 LIBRARY LINES FOR Cs137 FOUND Correlation = 0.00
0 OF 1 LIBRARY LINES FOR K40 FOUND Correlation = 0.00
0 OF 0 LIBRARY LINES FOR Name FOUND Correlation = 0.00
0 OF 1 LIBRARY LINES FOR Pb210 FOUND Correlation = 0.00
0 OF 1 LIBRARY LINES FOR Pu239 FOUND Correlation = 0.00
0 OF 2 LIBRARY LINES FOR U235 FOUND Correlation = 0.00
0 OF 1 LIBRARY LINES FOR U238 FOUND Correlation = 0.00

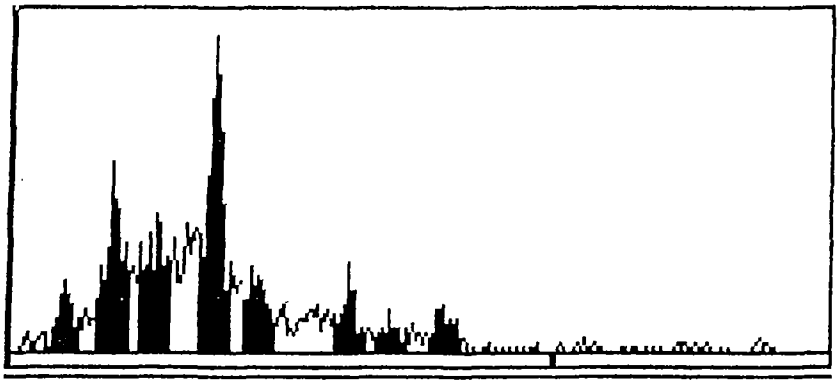
LINES NOT ASSOCIATED WITH ANY NUCLIDE:

Energy	Net CPM	Eff Corrected	
136.1	415.9	9251.4	C
343.8	150.4	6411.2	C
593.9	455.8	44788.8	C

MCA REPORT

		SAVED AS:	Spectrum # 11
DATE:	18-Feb-2005 11:59	BIAS:	742
EN CAL DATE:	18-Feb-2005 11:36	COARSE GAIN:	1
		FINE GAIN:	1.34
BKG DATE:	18-Feb-2005 11:36	LOW DISC:	0.41%
GROSS CPM:	11976	HIGH DISC:	100.05%
NET CPM:	7235	ELAPSED LT:	67.20
GROSS INTEGRAL:	13414	ELAPSED RT:	67.31
NET INTEGRAL:	8104	DEAD TIME:	0.16%

FULL SCALE: 292



PEAKS FOUND

CHN	ENERGY (keV)	GROSS CPM	AMBIENT CPM	CONTINUUM CPM	NET CPM	UNC %	
16	36.3	536	189	171	175 q	14.7	
31	81.9	1977	1000	603	374 q	14.1	Pb212
43	134.1	1855	983	691	179 q	28.6	
63	245.1	2015	508	908	598 q	8.03	Pb212
76	335.9	814	289	383	141 q	22.5	Th232
105	596.4	520	118	294	107 q	22.6	Th232
119	742.4	261	54	141	65 q	26.0	
136	941.1	331	50	127	153 q	12.1	

2 OF 2 LIBRARY LINES FOR Pb212 FOUND Correlation = 0.92

LINE	PEAK	INTENSITY	NET CPM
78.7	81.5	35.70	374
238.6	244.4	43.30	598

4 OF 4 LIBRARY LINES FOR Th232 FOUND Correlation = 0.80

LINE	PEAK	INTENSITY	NET CPM
86.0	81.5	14.00	374
238.6	244.4	15.00	598
347.0	339.7	4.00	141
590.0	597.0	3.20	107

1 OF 1 LIBRARY LINES FOR Ra224 FOUND Correlation = 0.80

LINE	PEAK	INTENSITY	NET CPM
241.0	244.4	3.97	598

NUCLIDES NOT PRESENT:

1 OF 2	LIBRARY LINES FOR	Bi214	FOUND	Correlation = 0.45
1 OF 3	LIBRARY LINES FOR	Bi212	FOUND	Correlation = 0.31
3 OF 9	LIBRARY LINES FOR	Ac228	FOUND	Correlation = 0.30
2 OF 5	LIBRARY LINES FOR	Tl208	FOUND	Correlation = 0.26
3 OF 5	LIBRARY LINES FOR	Pb214	FOUND	Correlation = 0.17
1 OF 3	LIBRARY LINES FOR	Ra226	FOUND	Correlation = 0.16
0 OF 1	LIBRARY LINES FOR	Am241	FOUND	Correlation = 0.00
0 OF 1	LIBRARY LINES FOR	Cs137	FOUND	Correlation = 0.00
0 OF 1	LIBRARY LINES FOR	K40	FOUND	Correlation = 0.00
0 OF 0	LIBRARY LINES FOR	Name	FOUND	Correlation = 0.00
0 OF 1	LIBRARY LINES FOR	Pb210	FOUND	Correlation = 0.00
0 OF 1	LIBRARY LINES FOR	Pu239	FOUND	Correlation = 0.00
0 OF 2	LIBRARY LINES FOR	U235	FOUND	Correlation = 0.00
0 OF 1	LIBRARY LINES FOR	U238	FOUND	Correlation = 0.00

LINES NOT ASSOCIATED WITH ANY NUCLIDE:

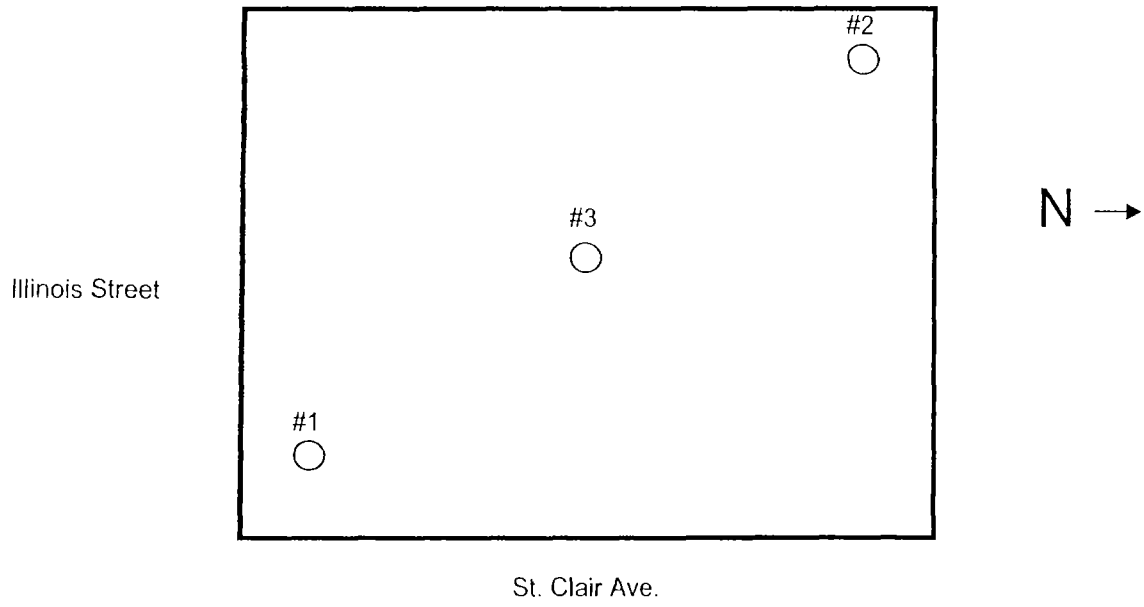
Energy	*Net CPM*	*Eff Corrected*	
35.8	175.9	6043.9	C
136.7	179.5	4041.1	C
737.0	65.2	9764.9	C
941.5	153.6	35562.4	C

APPENDIX C

Soil Boring Survey Results

Radiation Surveys of Test Drillings

160 E. Illinois Street - Chicago, IL



Hole #1	4/13/05
0 - 2'	9500 cpm
2' - 4'	8300 cpm
4' - 6'	8000 cpm
6' - 8'	7800 cpm

Hole #2	4/19/05
0 - 2'	8200 cpm
2' - 4'	7900 cpm
4' - 6'	7500 cpm
6' - 8'	7500 cpm

Hole #3	4/22/05
0 - 2'	10,900 cpm
2' - 4'	8800 cpm
4' - 6'	8200 cpm
6' - 8'	8000 cpm

Note: Above noted count rates are the maximum recorded for samples recovered or cuttings returned to the ground surface from the specified depths. These values include both the samples obtained by STS and the spoils that came out during the drilling process. Count rates at the ground surface were all less than 11,000 cpm in the vicinity of the holes. This higher count is likely due to crushed brick material currently at the ground surface. All distances noted are below the basement slab, not street level. Surveys were performed several feet into natural fill (sand).

Surveyed By: Glenn Huber

Instrument ID: Ludlum Model 2221 (serial no. 134542) w/ attached 2"x2" unshielded NaI probe

7.2 pCi/g Action Level = 18,500 cpm

APPENDIX D

Basement Slab and Sub-Slab Soil Survey Results

GeoSyntec Consultants
160 E. Illinois Street Survey

4/26/05 -5/2/05
Glenn Huber

Basement Slab

St Clair Ave.

11.2	10.8	10.5	10.9	11.1	10.4	9.7	9.9	10.1	10.6	10.3	9.2
9.9	10.6 □	10.3	10.6 □	10.7	11.1 □	10.3	10.6 □	9.8	9.9 □	10.1	9.7
11.0	10.7	10.4	10.5	11.1	10.8	10.2	10.1	9.6	9.8	9.5	9.6
11.3	10.8 □	10.7	10.0 □	10.8	9.9 □	10.3	9.7 □	10.3	9.5 □	10.4	10.2
10.7	9.9	9.6	10.2	10.8	11.2	10.7	9.9	9.8	9.5	9.8	9.5
11.1	10.3 □	10.5	10.4 □	11.4	10.5 □	11.3	11.4 □	10.0	9.6 □	9.5	9.4
9.8	11.0	11.3	11.7	12.3	12.0	12.4	12.2	10.8	11.0	11.2	10.3
10.2	10.9 □	11.0	12.0 □	11.9	12.1 □	12.5	10.9 □	10.4	10.5 □	11.4	9.7
10.9	11.2	11.6	11.8	12.1	11.7	11.4	10.7	11.0	10.5	10.5	9.8
11.4	11.8 □	11.4	12.1 □	12.6	11.8 □	11.1	10.3 □	10.4	10.6 □	10.8	10.6
11.3	12.0	11.7	12.4	11.2	11.4	10.9	11.4	9.8	10.4	11.3	11.2
11.2	11.7 □	11.8	12.6 □	11.3	11.9 □	11.8	11.0 □	10.4	10.1 □	10.7	11.0
11.3	11.9	13.0	10.6	11.2	11.8	10.6	12.1	9.5	11.3	11.8	13.0
12.2	12.1 □	12.7	10.9 □	10.8	10.4 □	10.5	10.4 □	9.6	9.8 □	10.6	12.4
10.8	9.4	9.1	9.9	10.2	8.9	9.7	9.6	9.7	9.6	10.8	11.4
12.1	12.3	8.8	9.4	9.1	9.2	9.2	7.8	8.2	8.9	9.8	11.8

← N

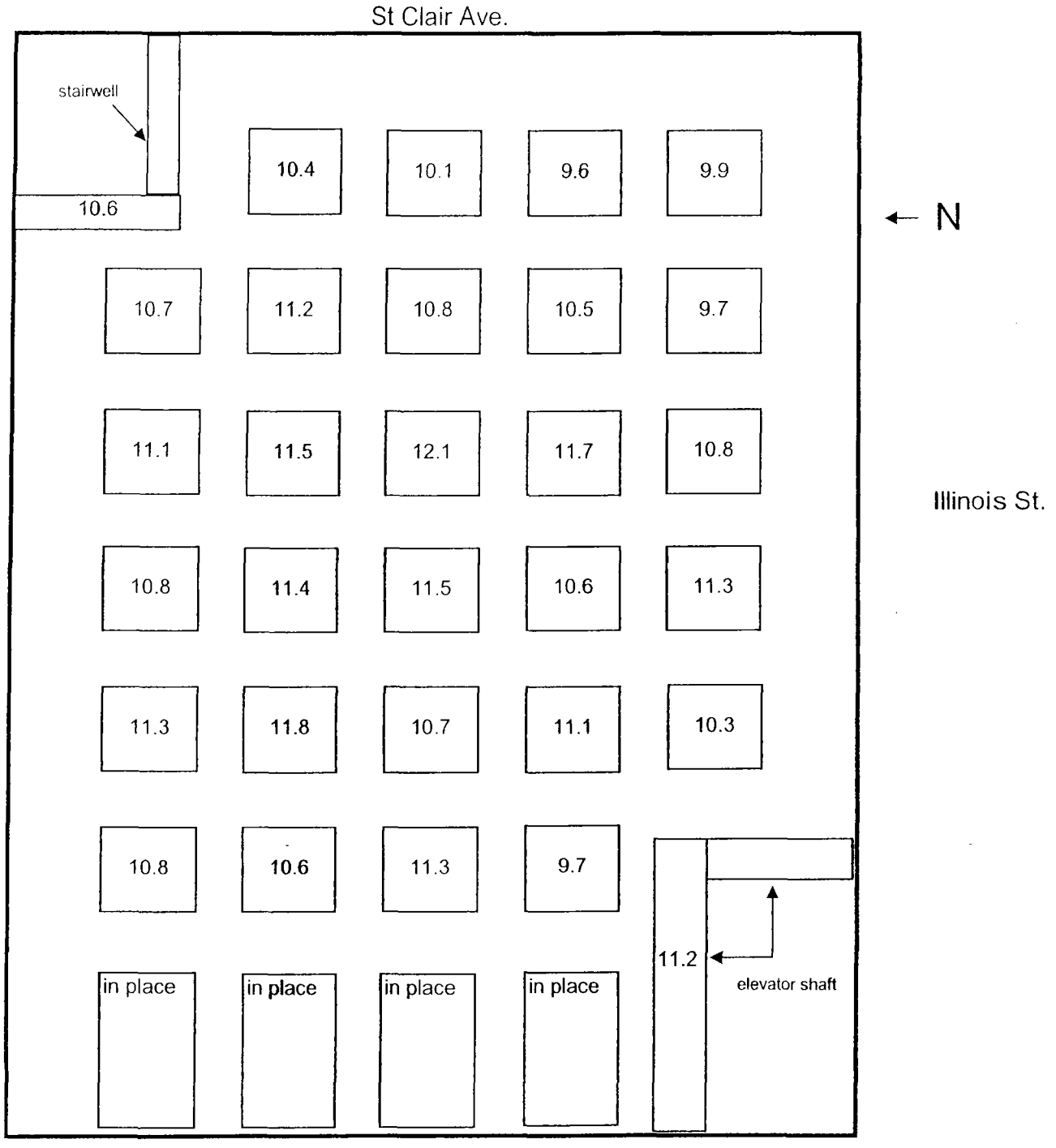
Illinois St.

Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542 & SN 127242)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

GeoSyntec Consultants 4/26/05-5/2/05
160 E. Illinois Street Survey Glenn Huber

Concrete Footings Below Slab



Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542 & SN 127242)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

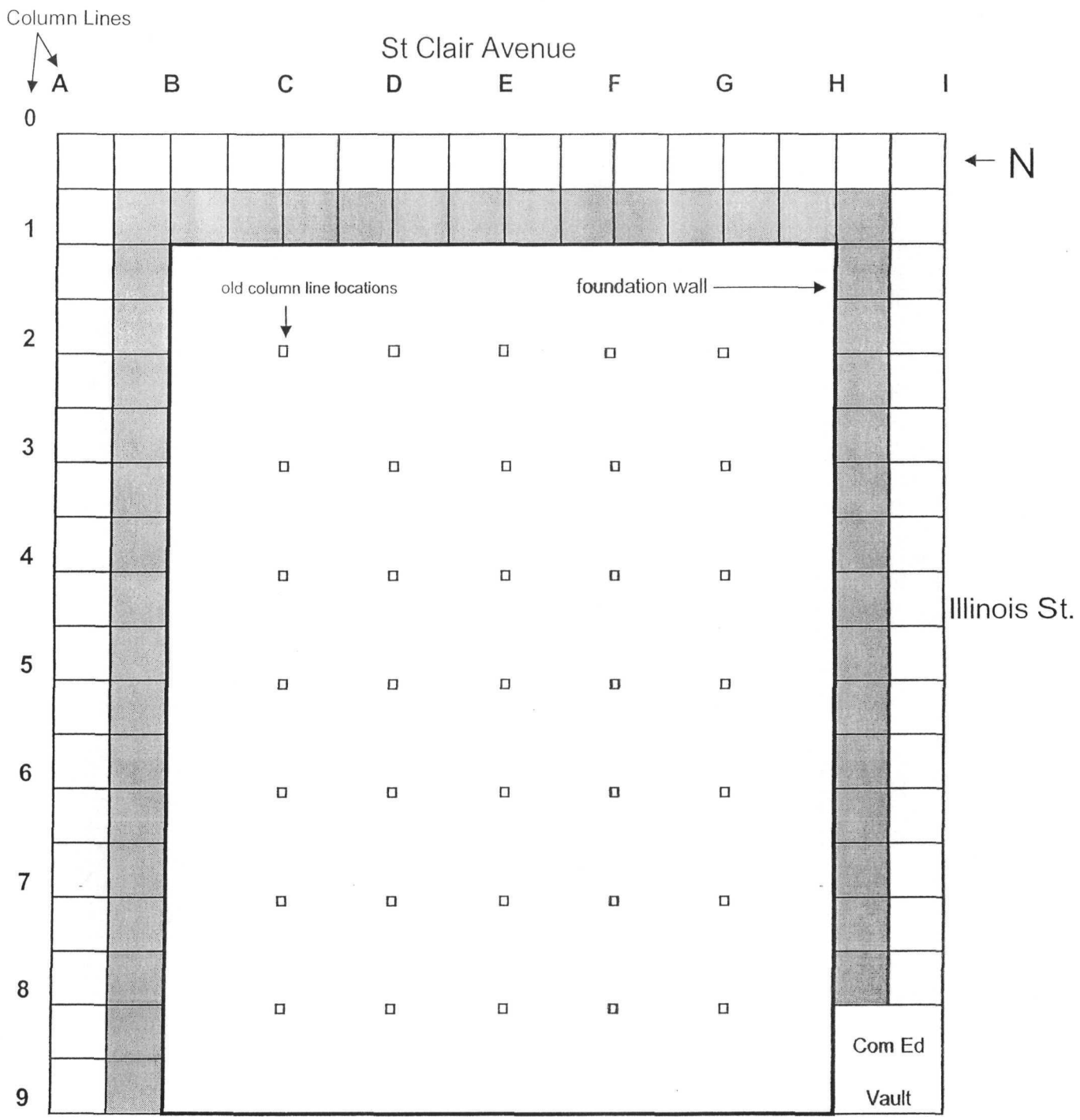
APPENDIX E

Offsite Perimeter Excavation Survey Results

GeoSyntec Consultants 7/6/05 -7/10/05

160 E. Illinois Street Perimeter Excavation Survey Glenn Huber

Site Overview



Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

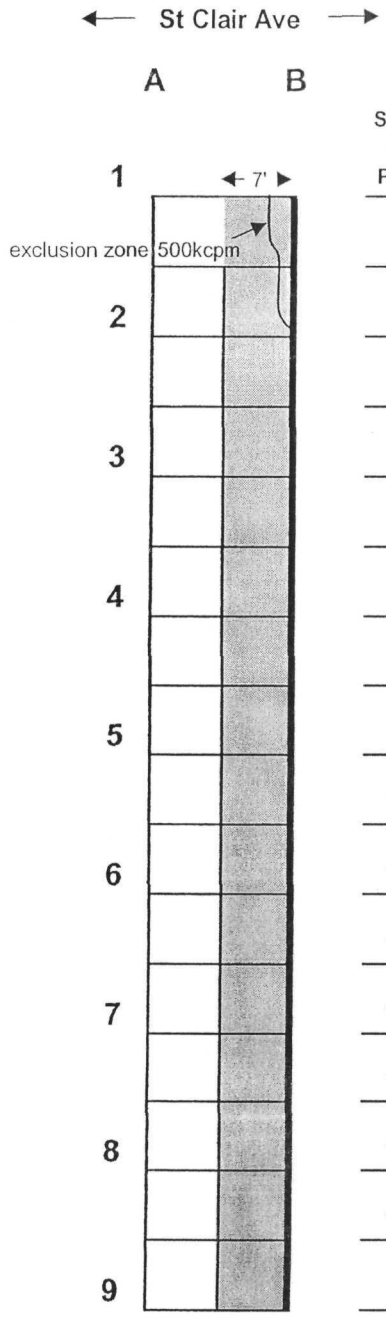
7.1 pCi/gram Action Level: 18,243 cpm

Background: 10-13 kcpm in alley
8 kcpm below concrete sidewalks

= excavated area (-8 feet)

GeoSyntec Consultants 7/6/05 -7/10/05

160 E. Illinois Street Perimeter Excavation Survey Glenn Huber



Alley Side

N

Surface Over Pavers	-1.5'	-3'	-4.5'	-6'	-7.5'
13.9	**500**	**250**	14.1	12.7	13.6
19.8	**31**	**22**	13.3	13.8	13.3
13.2	14.5	13.2	13.5	12.9	12.5
11.7	13.1	12.5	11.9	12.4	12.7
15.5	12.8	11.3	12.2	13.3	12.8
14.6	12.7	11.8	11.6	12.2	12.5
15.9	13.5	13.2	11.5	12.4	12.6
14.8	13.1	12.7	11.9	12.0	12.5
14.6	13.2	13.6	13.3	13.5	12.8
13.5	12.8	13.1	12.9	13.1	13.0
12.9	**30.5**	13.9	14.1	13.8	13.5
13.4	13.1	13.3	13.8	13.2	12.8
11.9	12.3	13.5	13.4	12.7	12.9
11.6	12.5	12.7	13.1	11.8	11.4
11.3	12.4	12.1	12.6	11.7	11.5
9.8	11.9	11.8	12.2	12.0	11.8

Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" Nal Probe (SN 134542)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

7.1 pCi/gram Action Level: 18,243 cpm

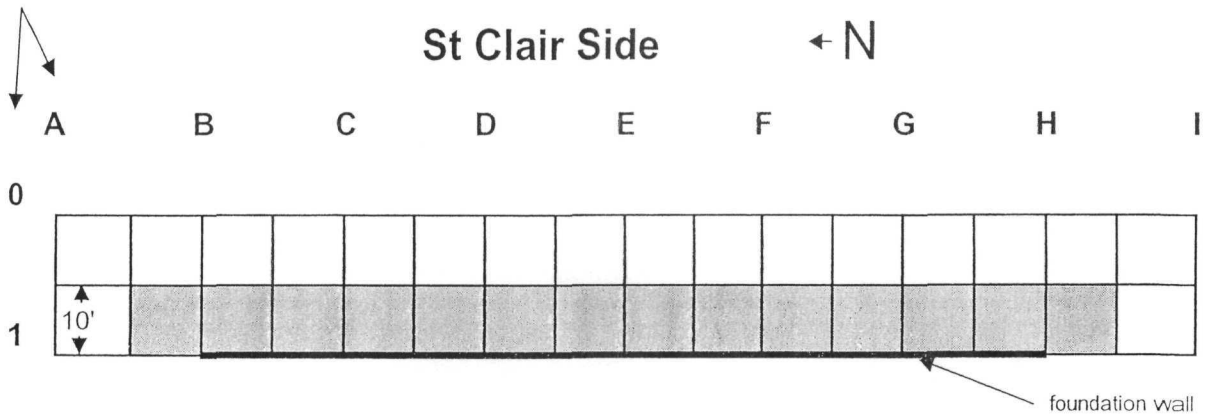
Background: 10-13 kcpm in alley

8 kcpm below concrete sidewalks

= excavated area (-8 feet)

GeoSyntec Consultants
160 E. Illinois Street Perimeter Excavation Survey

7/6/05 -7/10/05
Glenn Huber



	A	B	C	D	E	F	G	H	I
Surface Over Sidewalk	11.8	10.3	9.6	7.3	7.9	7.3	7.2	6.9	7.4	7.6	6.8	6.1	6.3	6.1
-1.5'	12.2	10.8	9.4	10.6	9.8	10.3	11.5	10.7	9.9	10.4	8.7	7.3	7.8	6.7
-3.0'	12.1	11.3	10.6	10.4	10.3	9.6	10.8	9.5	10.3	9.4	9.7	7.9	7.6	6.4
-4.5'	12.7	9.7	10.3	10.1	9.9	8.9	9.7	9.8	9.4	8.5	8.4	8.2	7.3	6.9
-6.0'	11.9	9.4	9.2	9.8	9.8	10.1	10.3	8.7	9.9	8.3	7.8	8.4	6.0	7.2
-7.5'	12.5	9.8	9.5	10.3	9.6	10.0	8.8	9.2	8.5	8.9	8.0	7.7	7.7	6.1

Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542)
All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

7.1 pCi/gram Action Level: 18,243 cpm
Background: 10-13 kcpm in alley
8 kcpm below concrete sidewalks

= excavated area (-8 feet)

GeoSyntec Consultants 7/6/05 -7/10/05

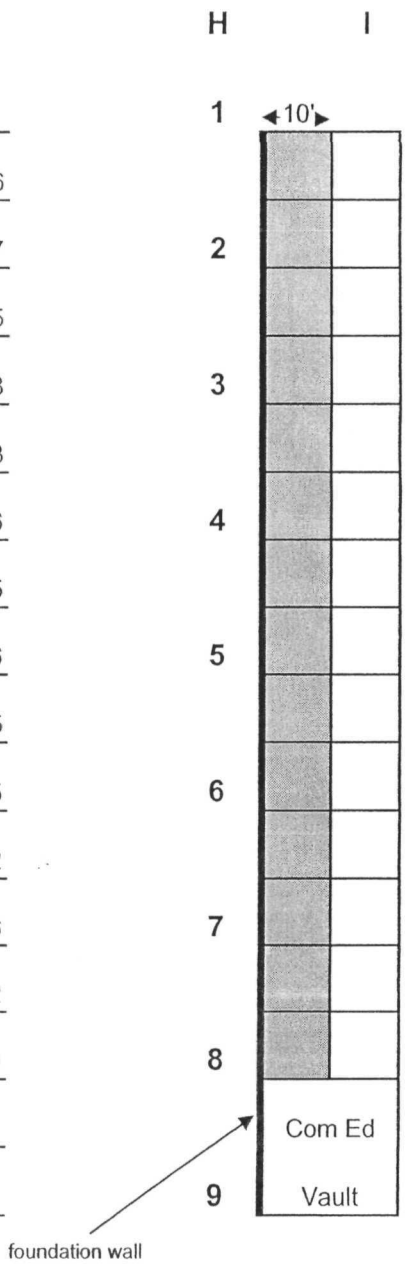
160 E. Illinois Street Perimeter Excavation Survey Glenn Huber

← St Clair Ave →

Illinois Street Side

←N

	Surface Over Sidewalk	-1.5'	-3'	-4.5'	-6'	-7.5'
1	6.7	7.2	7.8	9.1	7.7	8.6
2	6.5	7.4	8.4	8.9	8.5	8.7
	6.1	9.8	10.1	10.8	10.1	10.5
3	6.8	8.7	9.4	10.3	9.9	10.8
	6.9	11.3	12.1	10.8	10.4	11.3
4	7.8	10.7	12.3	11.6	11.6	12.6
	7.5	13.1	14.0	13.2	12.3	12.5
5	7.6	11	10.8	12.0	10.7	11.6
	7.4	10.7	11.4	12.1	11.8	11.5
6	7.1	12.6	12.9	13.7	13.5	12.5
	7.3	12.8	13.7	14.5	13.9	12.2
7	6.9	12.1	14.0	14.2	13.8	12.6
	8.1	12.4	13.3	13.6	13.1	13.2
8	7.6	11.7	13.5	13.4	14.0	13.0
9						



Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

7.1 pCi/gram Action Level: 18,243 cpm

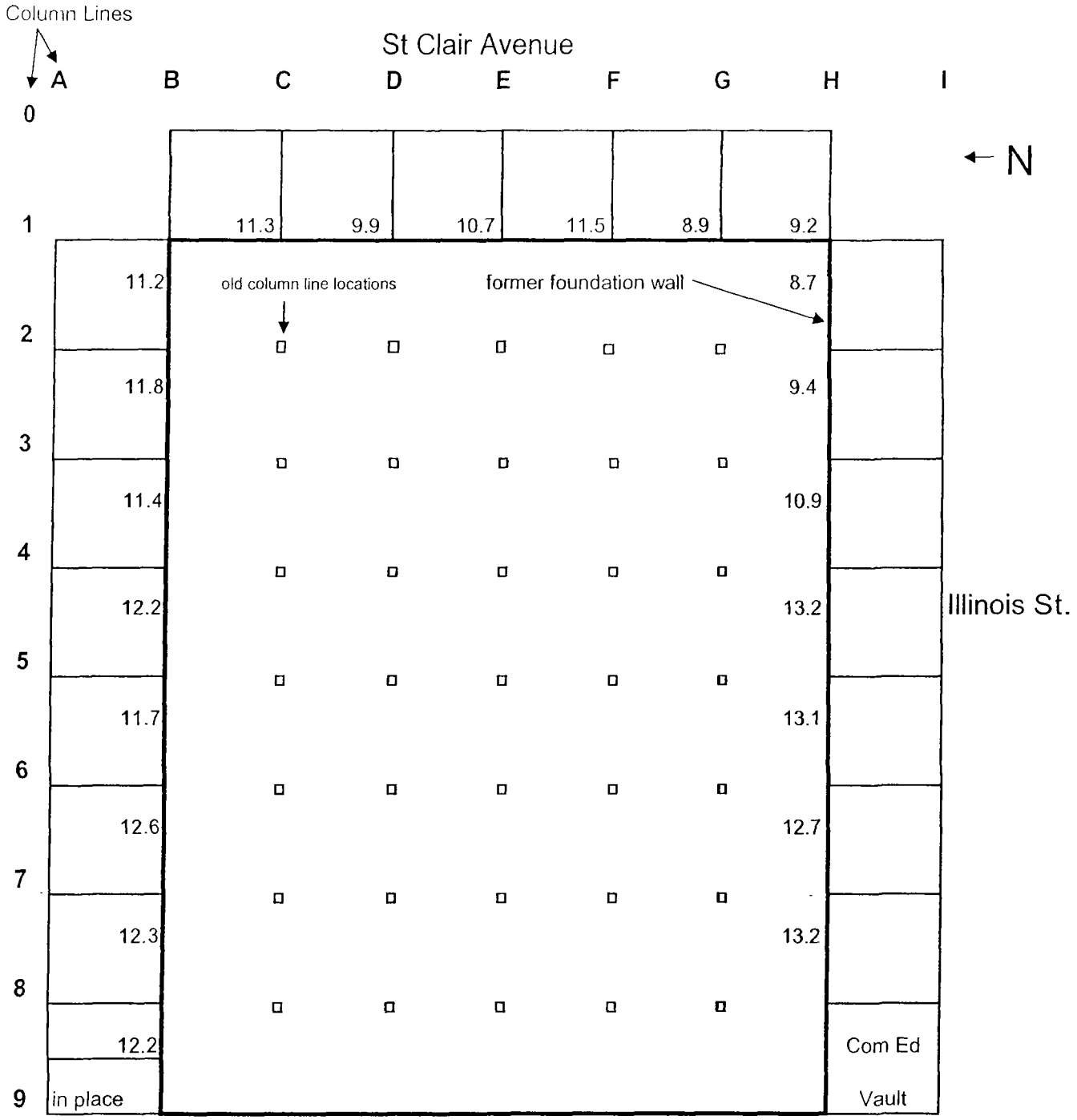
Background: 10-13 kcpm in alley
8 kcpm below concrete sidewalks

= excavated area (-8 feet)

GeoSyntec Consultants 7/6/05 -7/10/05

160 E. Illinois Street Perimeter Excavation Survey Glenn Huber

After Foundation Wall Removed



Surveyed ID: Ludlum Model 2221 Scaler Ratemeter w/ 2" NaI Probe (SN 134542)

All Results in 1000 Counts Per Minute (KCPM) 1000 x cpm

7.1 pCi/gram Action Level: 18,243 cpm

Background: 10-13 kcpm in alley
8 kcpm below concrete sidewalks

Readings represent maximum count rate underneath corresponding wall portion (after wall and footing removed)

*** One data point for each section**

APPENDIX F

Shipping Manifests (To be provided)

APPENDIX G

Soil Sample Analytical Data

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

AUG 31 2005

REPLY TO THE ATTENTION OF:

VIA FACSIMILE (312) 658-0576 AND U.S. MAIL

Mr. Richard Berggreen
GeoSyntec Consultants
55 West Wacker Drive, Suite 100
Chicago, Illinois 60601

RE: 160 East Illinois Street, Chicago, Illinois

Dear Mr. Berggreen:

Enclosed are summary sheets and laboratory reports for analysis of (1) the "hot spot" in the alley between 160 E. Illinois Street and 161 E. Grand Avenue, and (2) the verification sample after the "hot spot" was removed. The former was collected on July 7, 2005, and the latter on July 12, 2005. U.S. EPA did have our laboratory analyze the "hot spot"sample twice. Our results were as follows:

Hot Spot 360 picoCuries per gram (pCi/g), total radium
Hot Spot duplicate 371 pCi/g, total radium
Verification sample, which was composed of five 20-milliliter vials, showed an average total radium concentration of 1.79 pCi/g.

Please send us copies of your analyses by September 12.

If you have any questions about the enclosures, please contact me at (312) 886-3601 or Larry Jensen, Senior Health Physicist, at (312) 886-5026, or Eugene Jablonowski, Remedial Project Manager, at (312) 886-4591.

Sincerely,

Verneta Simon

Verneta Simon

Enclosures

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 5
SUPERFUND DIVISION
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

DATE: August 12, 2005

SUBJECT: Alley Samples: Surveillance and Verification

FROM: Larry Jensen, CHP
Senior Health Physicist
Field Services Section

TO: Verneta Simon
On-Scene Coordinator
Emergency Response Section #3

Attached are summary sheets and laboratory reports for analysis of (1) the "hot spot" in the alley between 160 E. Illinois Street and 161 E Grand Avenue and (2) the verification sample after the "hot spot" was removed. The former was collected on July 7, 2005, and the latter on July 12, 2005.

"Hot Spot"

The "hot spot" soil in the alley had a total radium (radium-226 + radium-228) concentration of about 360 - 371 picocuries per gram (pCi/g), all but about 2 pCi/g of which is radium-228. Overall, the data shows a Thorium Decay Series to Uranium Decay Series ratio of about 400 : 2 pCi/g.

Some uranium-235 is present as is the naturally occurring potassium-40.

Verification Samples

The primary verification sample, which was composed of soil from five 20-milliliter vials, showed an average total radium concentration of 1.79 pCi/g, well below the cleanup criterion of 7.1 pCi/g. Thus, cleanup was verified.

The Split 1 and Split 2 samples are larger volumes of the same soil, about 700 grams compared to 150 grams of the #1 - #5 vials. Results compare well, both between the two splits and between the splits and the five bottles. Both splits results support cleanups well below the 7.1 pCi/g cleanup criterion.

Some uranium-235, radium-223 and potassium-40 were measured.

Conclusions

The "hot spot" in the alley contained, very dominantly, the Thorium Decay Series at about 370 pCi/g.

The "hot spot" was removed and the remaining spot met criterion.

Kieffer Building, 160 E. Illinois St., Chicago, Illinois
Sample from alley between 160 E. Illinois and 161 E. Grand (west end of alley)

Total Radium (Ra-226 + Ra-228) based on (Pb-214 + Ra-228)---pCi/g

Original Count	371
Duplicate Count	360

Uranium Decay Series---pCi/g

	Ra-226	Pb-214	Bi-214
Original Count	2.14	1.91	2.17
Duplicate Count	4.00	1.83	2.15

Thorium Decay Series---pCi/g

	Ra-228	Ra-224	Rn-220	Pb-212	Bi-212	Tl-208	Tl-208/0.36
Original Count	369	379	488	379	387	119	331
Duplicate Count	358	496	414	356	381	117	325

Actinium Decay Series---pCi/g

	U-235
Original Count	0.135
Duplicate Count	0.251

Miscellaneous---pCi/g

	K-40
Original Count	29.7
Duplicate Count	30.0

Kieffer Building, 160 E. Illinois St., Chicago, Illinois
Verification sample from alley between 160 E. Illinois and 161 E. Grand (west end of alley)

Total Radium (Ra-226 + Ra-228) based on (Pb-214 + Ra-228)---pCi/g

A.8-1.5, Split 1	1.69
A.8-1.5, Split 2	1.60
A.8-1.5, Split 2, Duplicate count	1.80
A.8-1.5, EPA #1 - #5	1.79

Uranium Decay Series---pCi/g

	Ra-226	Pb-214	Bi-214
A.8-1.5, Split 1	0.979	0.493	0.450
A.8-1.5, Split 2	ND	0.453	0.410
A.8-1.5, Split 2, Duplicate count	0.994	0.513	0.440
A.8-1.5, EPA #1 - #5	1.40	0.560	0.473

Thorium Decay Series---pCi/g

	Ra-228	Ra-224	Pb-212	Bi-212	Tl-208	Tl-208/0.36
A.8-1.5, Split 1	1.20	1.09	1.21	1.08	0.392	1.09
A.8-1.5, Split 2	1.15	0.908	1.21	1.23	0.376	1.04
A.8-1.5, Split 2, Duplicate count	1.29	1.08	1.36	1.24	0.406	1.13
A.8-1.5, EPA #1 - #5	1.23	0.912	1.16	1.18	0.355	0.986

Actinium Decay Series---pCi/g

	U-235	Ra-223
A.8-1.5, Split 1	0.0615	0.300
A.8-1.5, Split 2	0.0508	ND
A.8-1.5, Split 2, Duplicate count	0.0624	ND
A.8-1.5, EPA #1 - #5	0.0879	0.205

Miscellaneous---pCi/g

	K-40
A.8-1.5, Split 1	6.99
A.8-1.5, Split 2	6.66
A.8-1.5, Split 2, Duplicate count	7.32
A.8-1.5, EPA #1 - #5	8.30

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RADIATION AND INDOOR AIR
National Air and Radiation Environmental Laboratory
540 South Morris Avenue, Montgomery, AL 36115-2601
(334) 270-3400

August 11, 2005

MEMORANDUM

SUBJECT: Radiochemical Results for
Lindsay Light II Samples

FROM: John Griggs, Chief
Monitoring and Analytical Services Branch

TO: Larry Jensen, Health Physicist
Region 5

Attached are data packages for gamma analysis of samples collected from the Lindsay Light Site in Chicago, IL. The samples constitute NAREL batch numbers 0500048 and 0500049.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Jack Barnette, Region 5, w/o attachments
Steve Ostrodka, SF, Region 5, w/o attachments
Mary Clark, (6601J), w/o attachments
Ron Fraass, NAREL

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0500048

Project: LINDSAY LIGHT II
Analysis Procedure: Gamma Spectrometry
Date Reported: 08/02/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.03360V	160 E. IL ALLEY NEC 5W	SAM	SOIL	07/07/2005	07/11/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria with the exception of radium-224.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Mary Wisdom 8/11/05
Mary F. Wisdom Date
Quality Assurance Coordinator

for Tonya B. Hudson 8/11/05
John Griggs, Ph.D. Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A *Z* score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The *Z* score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The *Z* score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the *Z* score is computed.

Each standard uncertainty used to compute a *Z* score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500048

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.03360V		N/A	07/21/2005	0009858K	0003799F
A5.03360V	DUP	N/A	07/22/2005	0009858K	0003799F

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500048

SAMPLE ANALYSIS REPORT

Sample #:	A5.03360V	QC batch #:	0003799F
Matrix:	SOIL	Prep batch #:	0009858K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.900e+02 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	DPS
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/20/2005 19:47	500.0	GE13	NSS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.5e+00	PCI/GWET	07/07/2005
Bi212		3.87e+02	2.2e+01		PCI/GWET	07/07/2005
Bi214	*	2.17e+00	2.3e-01		PCI/GWET	07/07/2005
Co60		ND		1.4e-01	PCI/GWET	07/07/2005
Cs137		ND		2.2e-01	PCI/GWET	07/07/2005
I131		ND		6.3e-01	PCI/GWET	07/07/2005
K40		2.97e+01	7.2e-01		PCI/GWET	07/07/2005
Pb210		ND		2.3e+01	PCI/GWET	07/07/2005
Pb212		3.79e+02	2.1e+01		PCI/GWET	07/07/2005
Pb214	*	1.91e+00	2.3e-01		PCI/GWET	07/07/2005
Ra224		3.79e+02	2.2e+01		PCI/GWET	07/07/2005
Ra226	*	2.14e+00	2.1e+00		PCI/GWET	07/07/2005
Ra228		3.69e+02	2.1e+01		PCI/GWET	07/07/2005
Rn220		4.88e+02	1.1e+02		PCI/GWET	07/07/2005
Tl208		1.19e+02	6.7e+00		PCI/GWET	07/07/2005
U235	*	1.35e-01	1.4e-01		PCI/GWET	07/07/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500048

SAMPLE ANALYSIS REPORT

Sample #:	A5.03360V	QC batch #:	0003799F
Matrix:	SOIL	Prep batch #:	0009858K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	6.900e+02 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	DPS
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/21/2005 11:43	1000.0	GE11	DPS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.1e+00	PCI/GWET	07/07/2005
Bi212		3.81e+02	2.2e+01		PCI/GWET	07/07/2005
Bi214	*	2.15e+00	1.9e-01		PCI/GWET	07/07/2005
Co60		ND		9.5e-02	PCI/GWET	07/07/2005
Cs137		ND		1.4e-01	PCI/GWET	07/07/2005
I131		ND		4.6e-01	PCI/GWET	07/07/2005
K40		3.00e+01	7.6e-01		PCI/GWET	07/07/2005
Pb210		ND		1.4e+01	PCI/GWET	07/07/2005
Pb212		3.56e+02	2.0e+01		PCI/GWET	07/07/2005
Pb214	*	1.83e+00	1.7e-01		PCI/GWET	07/07/2005
Ra224		4.96e+02	2.8e+01		PCI/GWET	07/07/2005
Ra226	*	4.00e+00	1.9e+00		PCI/GWET	07/07/2005
Ra228		3.58e+02	2.0e+01		PCI/GWET	07/07/2005
Rn220		4.14e+02	5.8e+01		PCI/GWET	07/07/2005
Tl208		1.17e+02	6.6e+00		PCI/GWET	07/07/2005
U235	*	2.51e-01	1.2e-01		PCI/GWET	07/07/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500048

QC BATCH SUMMARY

QC batch #: 0003799F
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A5.03360V		N/A		DPS
A5.03360V	DUP	N/A		DPS

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0003799F Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GWET)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A5.03360V	BA140				
A5.03360V	BE7	6.04e+00 ± 8.7e-01	6.91e+00 ± 7.4e-01	13.44	1.19 OK
A5.03360V	BI212	3.87e+02 ± 2.2e+01	3.81e+02 ± 2.2e+01	1.56	-0.19 OK
A5.03360V	CO60				
A5.03360V	CS137				
A5.03360V	I131				
A5.03360V	K40				
A5.03360V	PB210				
A5.03360V	PB212	3.79e+02 ± 2.1e+01	3.56e+02 ± 2.0e+01	6.26	-0.77 OK
A5.03360V	RA224	3.79e+02 ± 2.2e+01	4.96e+02 ± 2.8e+01	26.74	**3.28 HIGH**
A5.03360V	RA228	3.69e+02 ± 2.1e+01	3.58e+02 ± 2.0e+01	3.03	-0.37 OK
A5.03360V	RN220	4.88e+02 ± 1.1e+02	4.14e+02 ± 5.8e+01	16.41	-1.06 OK
A5.03360V	TL208	1.19e+02 ± 6.7e+00	1.17e+02 ± 6.6e+00	1.69	-0.21 OK

Analyst: David P. Saunders 8/11/05
Saunders, David P.

QA Officer: Mark D. McClure 8/11/05

^{224}Ra is out. kam

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #0500049

Project: LINDSAY LIGHT II
Analysis Procedure: Gamma Spectrometry
Date Reported: 07/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.03429Z	A.8-1.5 SPLIT 1	SAM	SOIL	07/12/2005	07/14/2005
A5.03430R	A.8-1.5 SPLIT 2	SAM	SOIL	07/12/2005	07/14/2005
A5.03431T	A.8-1.5, EPA #1 - #5	SAM	SOIL	07/12/2005	07/14/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Mary Wisdom 8/11/05
Mary F. Wisdom Date
Quality Assurance Coordinator

for
John Griggs, Ph.D. 8/11/05
Date
Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500049

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.03429Z		N/A	07/15/2005	0009846F	0003800E
A5.03430R		N/A	07/15/2005	0009846F	0003800E
A5.03430R	DUP	N/A	07/15/2005	0009846F	0003800E
A5.03431T		N/A	07/14/2005	0009846F	0003800E

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500049

SAMPLE ANALYSIS REPORT

Sample #:	A5.03430R	QC batch #:	0003800E
Matrix:	SOIL	Prep batch #:	0009846F
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.100e+02 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	DPS
Ash/dry weight:	N/A	QC type:	ANA

Comment: KEIFER BLDG.

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2005 13:25	1000.0	GE11	NSS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		4.4e-02	PCI/GWET	07/12/2005
Bi212		1.23e+00	1.1e-01		PCI/GWET	07/12/2005
Bi214	*	4.10e-01	2.8e-02		PCI/GWET	07/12/2005
Co60		ND		1.1e-02	PCI/GWET	07/12/2005
Cs137		ND		1.2e-02	PCI/GWET	07/12/2005
I131		ND		1.3e-02	PCI/GWET	07/12/2005
K40		6.66e+00	4.0e-01		PCI/GWET	07/12/2005
Pb210		ND		1.1e+00	PCI/GWET	07/12/2005
Pb212		1.21e+00	7.1e-02		PCI/GWET	07/12/2005
Pb214	*	4.53e-01	3.0e-02		PCI/GWET	07/12/2005
Ra224		9.08e-01	1.6e-01		PCI/GWET	07/12/2005
Ra226		ND		2.2e-01	PCI/GWET	07/12/2005
Ra228		1.15e+00	7.1e-02		PCI/GWET	07/12/2005
Tl208		3.76e-01	2.4e-02		PCI/GWET	07/12/2005
U235	*	5.08e-02	9.4e-03		PCI/GWET	07/12/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500049

SAMPLE ANALYSIS REPORT

Sample #:	A5.03430R	QC batch #:	0003800E
Matrix:	SOIL	Prep batch #:	0009846F
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.100e+02 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	DPS
Ash/dry weight:	N/A	QC type:	DUP

Comment: KEIFER BLDG.

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/15/2005 10:50	500.0	GE13	NSS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		7.0e-02	PCI/GWET	07/12/2005
Bi212		1.24e+00	1.5e-01		PCI/GWET	07/12/2005
Bi214	*	4.40e-01	3.4e-02		PCI/GWET	07/12/2005
Co60		ND		1.6e-02	PCI/GWET	07/12/2005
Cs137		ND		1.8e-02	PCI/GWET	07/12/2005
I131		ND		2.1e-02	PCI/GWET	07/12/2005
K40		7.32e+00	4.7e-01		PCI/GWET	07/12/2005
Pb210		ND		1.6e+00	PCI/GWET	07/12/2005
Pb212		1.36e+00	8.4e-02		PCI/GWET	07/12/2005
Pb214	*	5.13e-01	3.8e-02		PCI/GWET	07/12/2005
Ra224		1.08e+00	2.8e-01		PCI/GWET	07/12/2005
Ra226	*	9.94e-01	2.3e-01		PCI/GWET	07/12/2005
Ra228		1.29e+00	8.4e-02		PCI/GWET	07/12/2005
Tl208		4.06e-01	2.8e-02		PCI/GWET	07/12/2005
U235	*	6.24e-02	1.5e-02		PCI/GWET	07/12/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500049

SAMPLE ANALYSIS REPORT

Sample #:	A5.03431T	QC batch #:	0003800E
Matrix:	SOIL	Prep batch #:	0009846F
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.550e+02 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	DPS
Ash/dry weight:	N/A	QC type:	ANA

Comment: KEIFER BLDG.

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
07/14/2005 13:24	500.0	GE13	NSS

ANALYTICAL RESULTS

Analyte		Activity	± 2σ Uncertainty	MDC	Unit	Date
Ba140		ND		1.2e-01	PCI/GWET	07/12/2005
Bi212		1.18e+00	2.6e-01		PCI/GWET	07/12/2005
Bi214	*	4.73e-01	4.8e-02		PCI/GWET	07/12/2005
Co60		ND		3.0e-02	PCI/GWET	07/12/2005
Cs137		ND		3.4e-02	PCI/GWET	07/12/2005
I131		ND		3.5e-02	PCI/GWET	07/12/2005
K40		8.30e+00	6.1e-01		PCI/GWET	07/12/2005
Pb210		ND		2.7e+00	PCI/GWET	07/12/2005
Pb212		1.16e+00	8.0e-02		PCI/GWET	07/12/2005
Pb214	*	5.60e-01	5.2e-02		PCI/GWET	07/12/2005
Ra223		2.05e-01	8.8e-02		PCI/GWET	07/12/2005
Ra224		9.12e-01	4.3e-01		PCI/GWET	07/12/2005
Ra226	*	1.40e+00	3.7e-01		PCI/GWET	07/12/2005
Ra228		1.23e+00	9.7e-02		PCI/GWET	07/12/2005
Tl208		3.55e-01	3.1e-02		PCI/GWET	07/12/2005
U235	*	8.79e-02	2.3e-02		PCI/GWET	07/12/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500049

QC BATCH SUMMARY

QC batch #: 0003800E
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	± 2σ Uncertainty (%)	Analyst
A5.03429Z		N/A		DPS
A5.03430R		N/A		DPS
A5.03430R	DUP	N/A		DPS
A5.03431T		N/A		DPS

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0003800E Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GWET)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A5.03430R	BA140				
A5.03430R	BI212	1.23e+00 ± 1.1e-01	1.24e+00 ± 1.5e-01	0.81	0.08 OK
A5.03430R	CO60				
A5.03430R	CS137				
A5.03430R	I131				
A5.03430R	K40	6.66e+00 ± 4.0e-01	7.32e+00 ± 4.7e-01	9.44	1.13 OK
A5.03430R	PB210				
A5.03430R	PB212	1.21e+00 ± 7.1e-02	1.36e+00 ± 8.4e-02	11.67	1.41 OK
A5.03430R	RA224	9.08e-01 ± 1.6e-01	1.08e+00 ± 2.8e-01	17.30	0.98 OK
A5.03430R	RA228	1.15e+00 ± 7.1e-02	1.29e+00 ± 8.4e-02	11.48	1.37 OK
A5.03430R	TL208	3.76e-01 ± 2.4e-02	4.06e-01 ± 2.8e-02	7.67	0.91 OK

Analyst: David P. Saunders 8/11/05

Saunders, David P.

QA Officer: Mark D McKee 8/11/05

Nutranl Gamma Spec Report- 160 E. Illinois Street

Exclusion Zone Confirmatory Samples for July 12, 2005

Sample ID	Sample Date	Sample Group	Description	Weight	U-238 Activity	U-238 Uncertainty	Th-232 Activity	Th-232 Uncertainty	Ra-226 Activity	Ra-226 Uncertainty	Total Radium Activity	Total Radium Uncertainty
970	7/12/05	EPA	S2688 160IL A.8-1.5 EPA#1	30.4	-0.65	2.19	2.63	0.68	-0.64	0.87	1.79	1.104219
971	7/12/05	EPA	S2690 160IL A.8-1.5 EPA#2	28.5	-0.28	1.97	1.28	0.62	0.64	0.79	1.92	1.004241
972	7/12/05	EPA	S2691 160IL A.8-1.5 EPA#3	29.7	-2.14	2.27	1.53	0.72	1.81	0.96	3.34	1.200000
973	7/12/05	EPA	S2692 160IL A.8-1.5 EPA#4	30.5	-1.28	2.31	2.05	0.72	0.35	0.85	2.4	1.192015
974	7/12/05	EPA	S2693 160IL A.8-1.5 EPA#5	30.3	0.17	1.48	1.57	0.45	1.07	0.6	2.64	0.760000

Average Total Radium (Th-232+Ra-226) Concentration for : 160IL A.8-1.5 EPA: 2.42 pCi/g

Sent to EPA
7/14/05

Form 223-1

NOTIFICATION OF SUCCESSFUL VERIFICATION SURVEY

Area Identification: 160 E Illinois St A.8-1.5

Date of Verification Survey: 7/12/05

Time of Verification Survey: 11:00Am

The above-described excavation was surveyed at the time and date indicated above. The survey indicated that all soils have been removed as required by the Site Removal Action Criteria.

Documents pertaining to this survey are attached for review and approval by the U.S. EPA.

Signed:

_____ Date _____

_____ (Print Name)

_____ (Print Title)

The attached Verification Survey Documents were reviewed by U.S. EPA, Region V on 7/13/05. The results of this survey indicate that the verification criteria ~~as contained in the UAO~~, have been met.

Authorization is hereby granted to commence backfill and restoration work at this excavation.

Signed:

Veneta Simon Date 7/13/05

Veneta Simon (Print Name)

On-Scene Coordinator (Print Title)

For U.S. EPA Region V

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Version 6.0

Sample ID : 051329 Geosyntec NEC 5'W

Sample Size . . . . . 7.05e+002 g	Spectrum File . . h:\pcaspec\051329.spm
Sampling Start. 00-00-00 00:00	Counting Start. 07-11-05 09:36
Sampling Stop 00-00-00 00:00	Live Time . . . . . 3600 Sec
Current Date. 00-00-00 00:00	Real Time . . . . . 0 Sec

Detector #: 1

Energy(keV)= -1.82 + 0.245*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 06-27-05 11:35

FWHM(keV) = 1.33 + 0.030*En + 0.00e+000*En^2 + 0.00e+000*En^3 06-15-05 10:00
Where En = Sqrt(Energy in keV)

Sensitivity 2.00	Search Start / End. . . . . 0 / 8191
Sigma Multiplier. 1.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	75.07	314.42	91031	736	1387	96422	1.93	a
2	77.34	323.69	110487	682	1215	82226	1.27	b
3	84.75	353.99	18622	584	1186	63574	1.98	a
4	87.39	364.77	54775	573	1070	63173	1.56	b
5	90.09	375.83	42923	504	910	58304	1.39	c
6	93.48	389.69	41469	558	1040	71248	1.40	d
7	99.75	415.33	3589	845	1785	123329	1.30	e
8	105.55	439.05	16950	720	1492	91411	1.50	f
9	108.79	452.31	5440	623	1305	68996	1.82	g
10	115.34	479.08	6802	642	1308	90048	1.50	
11	129.20	535.77	24290	687	1368	103370	1.36	
12	154.05	637.37	9813	614	1237	84603	1.37	
13	199.60	823.62	3012	510	1023	64281	1.58	
14	209.36	863.53	42850	650	1295	70159	1.57	a
15	216.09	891.06	1959	769	1640	93465	1.42	b
16	238.70	983.53	477212	895	1187	64889	1.47	a
17	240.92	992.58	46480	333	482	21975	1.43	b
18	252.46	1039.80	2786	486	1006	46632	1.78	
19	270.31	1112.77	31585	519	1036	40166	1.51	a
20	277.52	1142.27	19645	582	1213	48693	1.52	b
21	288.16	1185.78	3075	404	827	34324	1.19	
22	300.21	1235.06	28767	409	765	30793	1.57	
23	321.81	1323.37	1884	493	1063	32880	1.49	a
24	328.05	1348.87	26556	392	738	27006	1.70	b
25	332.55	1367.29	4729	371	756	27690	2.64	c
26	338.40	1391.23	100208	566	1016	30720	1.66	d
27	351.91	1446.46	1725	365	757	26388	1.37	
28	409.55	1682.15	13094	329	637	20390	1.55	
29	453.00	1859.82	2164	277	563	16653	1.31	

30	463.14	1901.29	27017	345	632	18372	1.64	
31	510.79	2096.15	46181	403	717	21065	1.77	
32	562.63	2308.14	4284	273	549	15118	1.62	
33	583.35	2392.87	146856	493	648	18558	1.69	
34	609.52	2499.87	1223	265	547	13800	1.46	
35	727.51	2982.33	32809	315	541	12921	1.86	
36	755.66	3097.44	4699	293	614	11876	1.72	a
37	763.62	3129.99	2811	329	704	14052	2.03	b
38	772.59	3166.67	6426	234	461	9396	1.86	
39	782.38	3206.70	1905	170	339	5956	1.73	a
40	785.75	3220.48	4257	199	391	7107	1.87	b
41	795.21	3259.16	16819	252	453	8732	1.87	
42	830.87	3405.01	1558	203	427	6216	1.75	a
43	835.97	3425.85	6751	176	319	5369	1.94	b
44	840.68	3445.09	3658	182	364	5062	1.99	c
45	860.84	3527.56	17184	218	364	5846	1.92	
46	893.66	3661.77	1527	164	333	4908	1.61	
47	904.62	3706.59	2516	219	460	6602	1.90	a
48	911.51	3734.73	104577	377	413	5783	2.01	b
49	958.86	3928.35	1076	177	374	4343	1.86	a
50	965.08	3953.79	18733	181	241	3221	2.05	b
51	969.29	3971.02	61529	292	332	3728	2.06	c
52	988.59	4049.92	593	126	258	3064	2.09	
53	1033.60	4234.00	932	135	278	3047	2.52	
54	1065.41	4364.06	1161	134	273	3042	2.24	
55	1079.05	4419.84	1824	139	279	3075	1.71	
56	1094.56	4483.26	1932	133	264	2858	2.01	
57	1111.03	4550.61	1382	129	260	2768	1.48	
58	1247.20	5107.44	1707	146	298	3167	1.86	
59	1460.01	5977.63	2586	122	235	2098	2.52	
60	1496.55	6127.07	2320	117	229	1798	1.99	a
61	1502.07	6149.64	1229	112	227	1780	2.05	b
62	1513.44	6196.11	1000	105	213	1726	2.24	
63	1580.98	6472.29	1747	131	272	1881	2.58	a
64	1588.66	6503.69	8824	128	181	1425	2.36	b
65	1592.95	6521.26	5244	118	200	1311	2.62	c
66	1621.12	6636.46	3535	132	249	2529	2.07	
67	1631.13	6677.39	4127	134	254	1960	2.24	a
68	1638.77	6708.61	1113	119	245	1875	2.11	b
69	1667.00	6824.07	425	92	189	1583	2.20	

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Background Subtract Results

Sample ID : 051329 Geosyntec NEC 5'W

Bkg File: . . . .h:\gdr\bkg\nocal.bkg | Counting Start. 07-11-05 09:36
ID.:. . . NOCAL 24 Hour Background | Current Date 00-00-00 00:00

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	NEW NET COUNTS	NEW UN-CERTAINTY	FLAG
1	75.07	1.93	91031	736	90908	736	
3	84.75	1.98	18622	584	18592	584	
6	93.48	1.40	41469	558	41448	558	
16	238.70	1.47	477212	895	477181	895	
27	351.91	1.37	1725	365	1681	365	
31	510.79	1.77	46181	403	46086	403	
33	583.35	1.69	146856	493	146828	493	
34	609.52	1.46	1223	265	1176	265	
48	911.51	2.01	104577	377	104550	377	
51	969.29	2.06	61529	292	61513	292	
59	1460.01	2.52	2586	122	2400	122	

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 051329 Geosyntec **NEC 5'W**

Sample Size . . . . . 7.05e+002 g	Spectrum File . . h:\pcaspec\051329.spm
Sampling Start. 00-00-00 00:00	Counting Start. 07-11-05 09:36
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . . .h:\gdr\lib\nuthk.lib
ID. 2005	ID. . . . . U & Th Natural Series + K

Eff.= 1/[7.10e-002*En^-2.30e+000 + 8.10e+001*En^8.90e-001] 00-00-00 00:00

Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-212	Average:	9.50e-005 +-1.19e-006	1.01e+000	5 of 8
	452.83	2.68e-004 +-3.44e-005		
	727.00	1.70e-004 +-1.74e-006		
	727.17	1.02e-005 +-1.74e-006		
	785.00	1.51e-004 +-7.04e-006		
	1620.60	1.70e-004 +-6.36e-006		
Bi-214	609.31	1.42e-006 +-3.19e-007	3.32e-001	1 of 19
Pa-234	94.66	7.60e-006 +-9.99e-007	6.70e+000	1 of 10
Th-234	Average:	4.41e-005 +-4.09e-006	5.78e+002	2 of 3
	92.38	4.38e-005 +-5.75e-006		
	92.80	4.44e-005 +-5.83e-006		
Tl-208	Average:	9.48e-005 +-2.87e-007	5.09e-002	7 of 9
	74.97	9.35e-005 +-8.10e-006		
	84.90	9.35e-005 +-1.22e-005		
	277.35	8.39e-005 +-2.49e-006		
	510.84	1.02e-004 +-8.92e-007		
	583.14	9.35e-005 +-3.14e-007		
	763.13	1.19e-004 +-1.40e-005		
	860.37	1.04e-004 +-1.32e-006		
Pb-214	Average:	1.58e-006 +-3.23e-007	4.47e-001	5 of 7
	74.82	1.57e-006 +-4.47e-006		
	77.11	1.58e-006 +-2.35e-006		
	87.30	1.58e-006 +-3.74e-006		
	241.98	1.58e-006 +-1.17e-006		
	351.92	1.58e-006 +-3.42e-007		
Pb-212	Average:	2.69e-004 +-4.66e-007	1.06e+001	6 of 6
	74.82	2.79e-004 +-2.60e-006		
	77.11	2.20e-004 +-1.37e-006		
	87.30	2.06e-004 +-2.17e-006		

	115.19	2.65e-004 +-2.50e-005			
	238.63	2.79e-004 +-5.24e-007			
	300.09	2.60e-004 +-3.69e-006			
Th-228	Average:	2.01e-004 +-1.50e-005	1.68e+004	2 of	2
	84.37	2.01e-004 +-1.53e-005			
	215.98	2.01e-004 +-7.88e-005			
Ac-228	Average:	2.96e-004 +-6.49e-007	6.13e+000	21 of	22
	89.95	5.90e-004 +-6.93e-006			
	93.35	3.00e-004 +-4.50e-006			
	105.00	2.63e-004 +-1.12e-005			
	129.08	1.96e-004 +-5.54e-006			
	154.20	2.28e-004 +-1.43e-005			
	209.28	2.34e-004 +-3.55e-006			
	270.23	2.49e-004 +-4.10e-006			
	327.64	2.73e-004 +-4.03e-006			
	338.32	2.98e-004 +-1.68e-006			
	409.51	2.43e-004 +-6.11e-006			
	463.00	2.68e-004 +-3.42e-006			
	562.30	2.36e-004 +-1.51e-005			
	755.18	3.01e-004 +-1.88e-005			
	772.17	2.85e-004 +-1.04e-005			
	794.70	2.56e-004 +-3.83e-006			
	835.50	2.84e-004 +-7.39e-006			
	911.07	3.00e-004 +-1.08e-006			
	964.60	3.01e-004 +-2.90e-006			
	969.11	3.11e-004 +-1.48e-006			
	1588.00	3.24e-004 +-4.68e-006			
	1630.40	2.96e-004 +-9.62e-006			
Ra-224	240.98	3.06e-004 +-2.22e-006	8.69e+001	1 of	1
K-40	1460.80	2.72e-005 +-1.38e-006	1.12e+013	1 of	1

TOTAL: 1.34e-003 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
99.75	415.33	3589	845	1785	123329	1.30	2.458e+001
108.79	452.31	5440	623	1305	68996	1.82	3.463e+001
199.60	823.62	3012	510	1023	64281	1.58	1.857e+001
252.46	1039.80	2786	486	1006	46632	1.78	1.972e+001
288.16	1185.78	3075	404	827	34324	1.19	2.392e+001
321.81	1323.37	1884	493	1063	32880	1.49	1.596e+001
332.55	1367.29	4729	371	756	27690	2.64	4.111e+001
782.38	3206.70	1905	170	339	5956	1.73	3.452e+001
830.87	3405.01	1558	203	427	6216	1.75	2.977e+001
840.68	3445.09	3658	182	364	5062	1.99	7.063e+001
893.66	3661.77	1527	164	333	4908	1.61	3.113e+001
904.62	3706.59	2516	219	460	6602	1.90	5.184e+001
958.86	3928.35	1076	177	374	4343	1.86	2.334e+001
988.59	4049.92	593	126	258	3064	2.09	1.322e+001
1033.60	4234.00	932	135	278	3047	2.52	2.161e+001
1065.41	4364.06	1161	134	273	3042	2.24	2.766e+001
1079.05	4419.84	1824	139	279	3075	1.71	4.395e+001
1094.56	4483.26	1932	133	264	2858	2.01	4.714e+001
1111.03	4550.61	1382	129	260	2768	1.48	3.417e+001
1247.20	5107.44	1707	146	298	3167	1.86	4.677e+001

1496.55	6127.07	2320	117	229	1798	1.99	7.475e+001
1502.07	6149.64	1229	112	227	1780	2.05	3.973e+001
1513.44	6196.11	1000	105	213	1726	2.24	3.254e+001
1580.98	6472.29	1747	131	272	1881	2.58	5.910e+001
1592.95	6521.26	5244	118	200	1311	2.62	1.786e+002
1638.77	6708.61	1113	119	245	1875	2.11	3.888e+001
1667.00	6824.07	425	92	189	1583	2.20	1.507e+001

APPENDIX H

Air Monitoring Analytical Data

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 1 **Monday February 21, 2005 - Friday February 25, 2005**

							day after analysis					four day analysis					% of Limit
Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	4.00E-15 uCi/ml
16001N	2/21/2005	8:02am	4:41pm	519	45	2.31E+07	2/22/2005	16	12	0.13333	2.38E-15	2/25/2005	12	12	0	0.00E+00	0.00%
16001ST	2/21/2005	7:56am	4:48pm	532	45	2.37E+07	2/22/2005	22	12	0.33333	5.81E-15	2/25/2005	11	12	0	0.00E+00	0.00%
16001SB	2/21/2005	7:58am	4:46pm	528	41	2.15E+07	2/22/2005	29	12	0.56667	1.09E-14	2/25/2005	13	12	0.033	6.43E-16	16.06%
16001E	2/21/2005	8:01am	4:43pm	522	45	2.33E+07	2/22/2005	28	12	0.53333	9.48E-15	2/25/2005	10	12	0	0.00E+00	0.00%
16002N	2/22/2005	7:48am	4:44pm	536	47	2.50E+07	2/23/2005	21	10	0.36667	6.07E-15	2/28/2005	10	12	0	0.00E+00	0.00%
16002ST	2/22/2005	7:42am	4:50pm	548	47	2.55E+07	2/23/2005	22	10	0.4	6.48E-15	2/28/2005	12	12	0	0.00E+00	0.00%
16002SB	2/22/2005	7:40am	4:52pm	552	42	2.30E+07	2/23/2005	29	10	0.63333	1.14E-14	2/28/2005	11	12	0	0.00E+00	0.00%
16002E	2/22/2005	7:46am	4:46pm	540	44	2.35E+07	2/23/2005	31	10	0.7	1.23E-14	2/28/2005	12	12	0	0.00E+00	0.00%
16003N	2/23/2005	7:59am	4:20pm	501	45	2.23E+07	2/24/2005	14	11	0.1	1.85E-15	2/28/2005	11	12	0	0.00E+00	0.00%
16003ST	2/23/2005	7:44am	4:24pm	520	46	2.37E+07	2/24/2005	16	11	0.16667	2.91E-15	2/28/2005	13	12	0.033	5.82E-16	14.54%
16003SB	2/23/2005	7:42am	4:25pm	523	43	2.23E+07	2/24/2005	19	11	0.26667	4.95E-15	2/28/2005	12	12	0	0.00E+00	0.00%
16003E	2/23/2005	7:58am	4:18pm	500	50	2.48E+07	2/24/2005	12	11	0.03333	5.56E-16	2/28/2005	9	12	0	0.00E+00	0.00%
16004N	2/24/2005	7:57am	4:08pm	491	47	2.29E+07	2/25/2005	17	12	0.16667	3.01E-15	3/1/2005	13	11	0.067	1.21E-15	30.14%
16004ST	2/24/2005	8:01am	4:13pm	492	47	2.29E+07	2/25/2005	16	12	0.13333	2.41E-15	3/1/2005	10	11	0	0.00E+00	0.00%
16004SB	2/24/2005	7:59am	4:14pm	495	50	2.45E+07	2/25/2005	22	12	0.33333	5.62E-15	3/1/2005	11	11	0	0.00E+00	0.00%
16004E	2/24/2005	7:56am	4:10pm	494	44	2.15E+07	2/25/2005	16	12	0.13333	2.56E-15	3/1/2005	12	11	0.033	6.40E-16	16.00%
16005N	2/25/2005	8:01am	4:01pm	480	45	2.14E+07	2/28/2005	13	12	0.03333	6.44E-16	3/2/2005	11	11	0	0.00E+00	0.00%
16005ST	2/25/2005	7:56am	4:08pm	492	45	2.19E+07	2/28/2005	14	12	0.06667	1.26E-15	3/2/2005	13	11	0.067	1.26E-15	31.42%
16005SB	2/25/2005	7:55am	4:09pm	494	46	2.25E+07	2/28/2005	12	12	0	0.00E+00	3/2/2005	10	11	0	0.00E+00	0.00%
16005E	2/25/2005	8:00am	4:02pm	482	48	2.29E+07	2/28/2005	11	12	0	0.00E+00	3/2/2005	10	11	0	0.00E+00	0.00%

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 2 **Monday February 28, 2005 - Friday March 4, 2005**

Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	day after analysis					four day analysis					% of Limit 4.00E-15 uCi/ml
							date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	
16006N	2/28/2005	9:20am	3:58pm	398	46	1.81E+07	3/1/2005	14	11	0.1	2.28E-15	3/4/2005	11	11	0	0.00E+00	0.00%
16006ST	2/28/2005	9:25am	4:01pm	396	46	1.81E+07	3/1/2005	18	11	0.23333	5.35E-15	3/4/2005	12	11	0.033	7.64E-16	19.09%
16006SB	2/28/2005	9:24am	4:03pm	399	46	1.82E+07	3/1/2005	21	11	0.33333	7.58E-15	3/4/2005	10	11	0	0.00E+00	0.00%
16006E	2/28/2005	9:18am	4:00pm	402	44	1.75E+07	3/1/2005	16	11	0.16667	3.93E-15	3/4/2005	11	11	0	0.00E+00	0.00%
16007N	3/1/2005	7:59am	3:50pm	471	48	2.24E+07	3/2/2005	18	11	0.23333	4.31E-15	3/7/2005	12	13	0	0.00E+00	0.00%
16007ST	3/1/2005	8:04am	3:54pm	470	47	2.19E+07	3/2/2005	22	11	0.36667	6.93E-15	3/7/2005	9	13	0	0.00E+00	0.00%
16007SB	3/1/2005	8:02am	3:55pm	473	43	2.02E+07	3/2/2005	25	11	0.46667	9.58E-15	3/7/2005	13	13	0	0.00E+00	0.00%
16007E	3/1/2005	7:58am	3:52pm	474	45	2.11E+07	3/2/2005	17	11	0.2	3.91E-15	3/7/2005	13	13	0	0.00E+00	0.00%
16008N	3/2/2005	7:49am	4:10pm	501	43	2.14E+07	3/3/2005	16	10	0.2	3.87E-15	3/7/2005	12	13	0	0.00E+00	0.00%
16008ST	3/2/2005	7:42am	4:04pm	502	40	1.99E+07	3/3/2005	15	10	0.16667	3.46E-15	3/7/2005	13	13	0	0.00E+00	0.00%
16008SB	3/2/2005	7:40am	4:05pm	505	41	2.05E+07	3/3/2005	26	10	0.53333	1.07E-14	3/7/2005	13	13	0	0.00E+00	0.00%
16008E	3/2/2005	7:48am	4:12pm	504	43	2.15E+07	3/3/2005	22	10	0.4	7.70E-15	3/7/2005	14	13	0.033	6.42E-16	16.05%
16009N	3/3/2005	8:03am	4:08pm	485	42	2.02E+07	3/4/2005	15	11	0.13333	2.73E-15	3/8/2005	11	12	0	0.00E+00	0.00%
16009ST	3/3/2005	7:59am	4:02pm	483	43	2.06E+07	3/4/2005	17	11	0.2	4.02E-15	3/8/2005	13	12	0.033	6.70E-16	16.74%
16009SB	3/3/2005	7:58am	4:04pm	486	45	2.17E+07	3/4/2005	20	11	0.3	5.72E-15	3/8/2005	10	12	0	0.00E+00	0.00%
16009E	3/3/2005	8:02am	4:09pm	487	42	2.03E+07	3/4/2005	17	11	0.2	4.08E-15	3/8/2005	12	12	0	0.00E+00	0.00%
16010N	3/4/2005	7:51am	3:12pm	441	43	1.88E+07	3/7/2005	15	13	0.06667	1.47E-15	3/9/2005	12	12	0	0.00E+00	0.00%
16010ST	3/4/2005	7:54am	OFF	N/A	N/A	N/A	See Below					See Below					N/A
16010SB	3/4/2005	7:53am	3:18pm	445	43	1.90E+07	3/7/2005	13	13	0	0.00E+00	3/9/2005	12	12	0	0.00E+00	0.00%
16010E	3/4/2005	7:50am	3:13pm	443	46	2.02E+07	3/7/2005	15	13	0.06667	1.37E-15	3/9/2005	11	12	0	0.00E+00	0.00%

Note: On 3/4/05 the South Top Monitor blew a fuse sometime during the day and shut down. Total sample time unknown = no valid sample collected. GAH

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 3 **Monday March 7, 2005 - Friday March 11, 2005**

Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	day after analysis					four day analysis					% of Limit
							date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	4.00E-15 uCi/ml
16011N	3/7/2005	7:57am	4:01pm	484	46	2.21E+07	3/8/2005	52	12	1.33333	2.50E-14	3/11/2005	11	11	0	0.00E+00	0.00%
16011ST	3/7/2005	7:54am	4:07pm	493	47	2.30E+07	3/8/2005	55	12	1.43333	2.58E-14	3/11/2005	10	11	0	0.00E+00	0.00%
16011SB	3/7/2005	7:52am	4:08pm	496	44	2.16E+07	3/8/2005	50	12	1.26667	2.42E-14	3/11/2005	12	11	0 033	6.37E-16	15.94%
16011E	3/7/2005	7:56am	4:03pm	487	45	2.17E+07	3/8/2005	62	12	1.66667	3.17E-14	3/11/2005	9	11	0	0.00E+00	0.00%

No Demolition or Air Sampling Performed on:
Tuesday 3/8/05
Wednesday 3/9/05
Thursday 3/10/05
Friday 3/11/05

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 4 **Monday March 14, 2005 - Friday March 18, 2005**

Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	day after analysis					four day analysis					% of Limit 4.00E-15 uCi/ml
							date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	
16012N	3/14/2004	7:53am	4:40pm	527	40	2.09E+07	3/15/2005	89	10	2.63333	5.21E-14	3/18/2005	11	11	0	0.00E+00	0.00%
16012ST	3/14/2005	8:00am	4:44pm	524	40	2.08E+07	3/15/2005	58	10	1.6	3.19E-14	3/18/2005	10	11	0	0.00E+00	0.00%
16012SB	3/14/2005	7:58am	4:46pm	528	44	2.30E+07	3/15/2005	60	10	1.66667	2.99E-14	3/18/2005	12	11	0.033	5.99E-16	14.97%
16012E	3/14/2005	7:51am	4:41pm	530	43	2.26E+07	3/15/2005	53	10	1.43333	2.62E-14	3/18/2005	10	11	0	0.00E+00	0.00%
16013N	3/15/2005	8:03am	4:28pm	505	42	2.10E+07	3/16/2005	27	12	0.5	9.84E-15	3/21/2005	13	12	0.033	6.56E-16	16.40%
16013ST	3/15/2005	8:08am	4:38pm	510	43	2.17E+07	3/16/2005	36	12	0.8	1.52E-14	3/21/2005	11	12	0	0.00E+00	0.00%
16013SB	3/15/2005	8:05am	4:35pm	510	45	2.27E+07	3/16/2005	41	12	0.96667	1.76E-14	3/21/2005	10	12	0	0.00E+00	0.00%
16013E	3/15/2005	8:01am	4:30pm	509	46	2.32E+07	3/16/2005	29	12	0.56667	1.01E-14	3/21/2005	13	12	0.033	5.94E-16	14.85%
16014N	3/16/2005	8:03am	4:30pm	508	44	2.22E+07	3/17/2005	132	10	4.06667	7.59E-14	3/21/2005	11	12	0	0.00E+00	0.00%
16014ST	3/16/2005	8:07am	4:36pm	509	47	2.37E+07	3/17/2005	140	10	4.33333	7.56E-14	3/21/2005	12	12	0	0.00E+00	0.00%
16014SB	3/16/2005	8:05am	4:39pm	514	42	2.14E+07	3/17/2005	118	10	3.6	6.96E-14	3/21/2005	14	12	0.067	1.29E-15	32.22%
16014E	3/16/2005	8:01am	4:32pm	511	42	2.13E+07	3/17/2005	84	10	2.46667	4.80E-14	3/21/2005	13	12	0.033	6.48E-16	16.20%
16015N	3/17/2005	8:05am	4:12pm	487	45	2.17E+07	3/18/2005	16	11	0.16667	3.17E-15	3/22/2005	12	11	0.033	6.35E-16	15.87%
16015ST	3/17/2005	8:09am	4:18pm	489	44	2.13E+07	3/18/2005	18	11	0.23333	4.53E-15	3/22/2005	11	11	0	0.00E+00	0.00%
16015SB	3/17/2005	8:07am	4:20pm	493	45	2.20E+07	3/18/2005	21	11	0.33333	6.27E-15	3/22/2005	9	11	0	0.00E+00	0.00%
16015E	3/17/2005	8:04am	4:14pm	490	40	1.94E+07	3/18/2005	14	11	0.1	2.13E-15	3/22/2005	11	11	0	0.00E+00	0.00%
16016N	3/18/2005	7:48am	3:12pm	444	44	1.94E+07	3/21/2005	15	12	0.1	2.14E-15	3/23/2005	9	11	0	0.00E+00	0.00%
16016ST	3/18/2005	7:50am	3:18pm	448	45	2.00E+07	3/21/2005	11	12	0	0.00E+00	3/23/2005	11	11	0	0.00E+00	0.00%
16016SB	3/18/2005	7:53am	3:20pm	447	41	1.82E+07	3/21/2005	14	12	0.06667	1.52E-15	3/23/2005	13	11	0.067	1.52E-15	37.95%
16016E	3/18/2005	7:46am	3:14pm	448	41	1.82E+07	3/21/2005	12	12	0	0.00E+00	3/23/2005	10	11	0	0.00E+00	0.00%

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 5 **Monday March 21, 2005 - Friday March 25, 2005**

							day after analysis					four day analysis					% of Limit
Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	4.00E-15 uCi/ml
16017N	3/21/2005	7:51am	4:22pm	511	43	2.18E+07	3/22/2005	18	11	0.23333	4.43E-15	3/25/2005	12	12	0	0.00E+00	0.00%
16017ST	3/21/2005	7:57am	4:25pm	508	44	2.22E+07	3/22/2005	16	11	0.16667	3.11E-15	3/25/2005	9	12	0	0.00E+00	0.00%
16017SB	3/21/2005	7:54am	4:27pm	513	44	2.24E+07	3/22/2005	16	11	0.16667	3.08E-15	3/25/2005	10	12	0	0.00E+00	0.00%
16017E	3/21/2005	7:50am	4:21pm	511	45	2.28E+07	3/22/2005	13	11	0.06667	1.21E-15	3/25/2005	12	12	0	0.00E+00	0.00%
16018N	3/22/2005	7:55am	4:28pm	513	43	2.19E+07	3/23/2005	15	11	0.13333	2.52E-15	3/28/2005	10	10	0	0.00E+00	0.00%
16018ST	3/22/2005	8:02am	4:17pm	495	45	2.21E+07	3/23/2005	16	11	0.16667	3.12E-15	3/28/2005	12	10	0.067	1.25E-15	31.23%
16018SB	3/22/2005	7:58am	4:19pm	501	44	2.18E+07	3/23/2005	22	11	0.36667	6.94E-15	3/28/2005	12	10	0.067	1.26E-15	31.55%
16018E	3/22/2005	7:54am	4:29pm	515	44	2.25E+07	3/23/2005	23	11	0.4	7.37E-15	3/28/2005	10	10	0	0.00E+00	0.00%
16019N	3/23/2005	7:58am	4:21pm	503	42	2.09E+07	3/24/2005	18	13	0.16667	3.29E-15	3/28/2005	12	10	0.067	1.32E-15	32.92%
16019ST	3/23/2005	7:53am	4:15pm	502	46	2.29E+07	3/24/2005	22	13	0.3	5.42E-15	3/28/2005	9	10	0	0.00E+00	0.00%
16019SB	3/23/2005	7:50am	4:17pm	507	45	2.26E+07	3/24/2005	24	13	0.36667	6.71E-15	3/28/2005	11	10	0.033	6.10E-16	15.24%
16019E	3/23/2005	7:57am	4:23pm	506	42	2.11E+07	3/24/2005	19	13	0.2	3.93E-15	3/28/2005	10	10	0	0.00E+00	0.00%
16020N	3/24/2005	7:57am	4:06pm	489	44	2.13E+07	3/25/2005	15	12	0.1	1.94E-15	3/29/2005	10	12	0	0.00E+00	0.00%
16020ST	3/24/2005	7:54am	4:17pm	503	44	2.19E+07	3/25/2005	16	12	0.13333	2.51E-15	3/29/2005	12	12	0	0.00E+00	0.00%
16020SB	3/24/2005	7:51am	4:11pm	500	42	2.08E+07	3/25/2005	19	12	0.23333	4.64E-15	3/29/2005	13	12	0.033	6.62E-16	16.56%
16020E	3/24/2005	7:56am	4:07pm	491	44	2.14E+07	3/25/2005	14	12	0.06667	1.29E-15	3/29/2005	10	12	0	0.00E+00	0.00%
No Air Monitoring on 3/25/05 due to rain and snow																	

Area Air Monitoring Summary Sheet - Staplex High Volume Pumps (Daily Analysis)

160 E. Illinois St. - Building Demolition ***Chicago, IL***

Report No. 6 **Monday March 28, 2005 - Friday April 1, 2005**

							day after analysis					four day analysis					% of Limit
Sample ID	date sampled	start time	stop time	total time sampled	cubic ft/ min (CFM)	sample volume analyzed	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	date analyzed	gross counts	bkg counts	net cpm	Concentration in uCi/ml	4.00E-15 uCi/ml
16021N	3/28/2005	7:44am	4:10pm	506	45	2.26E+07	3/29/2005	28	12	0.53333	9.77E-15	4/1/2005	12	11	0.033	6.11E-16	15.27%
16021ST	3/28/2005	7:51am	4:05pm	494	44	2.15E+07	3/29/2005	30	12	0.6	1.15E-14	4/1/2005	11	11	0	0.00E+00	0.00%
16021SB	3/28/2005	7:46am	4:06pm	500	44	2.18E+07	3/29/2005	37	12	0.83333	1.58E-14	4/1/2005	11	11	0	0.00E+00	0.00%
16021E	3/28/2005	7:42am	4:08pm	506	41	2.06E+07	3/29/2005	30	12	0.6	1.21E-14	4/1/2005	12	11	0.033	6.71E-16	16.76%
16022N	3/29/2005	8:06am	4:28pm	502	40	1.99E+07	3/31/2005	19	12	0.23333	4.85E-15	4/4/2005	12	12	0	0.00E+00	0.00%
16022ST	3/29/2005	8:12am	4:21pm	489	45	2.18E+07	3/31/2005	16	12	0.13333	2.53E-15	4/4/2005	9	12	0	0.00E+00	0.00%
16022SB	3/29/2005	8:09am	4:24pm	495	42	2.06E+07	3/31/2005	20	12	0.26667	5.35E-15	4/4/2005	11	12	0	0.00E+00	0.00%
16022E	3/29/2005	8:05am	4:29pm	504	40	2.00E+07	3/31/2005	15	12	0.1	2.07E-15	4/4/2005	12	12	0	0.00E+00	0.00%
16023N	3/30/2005	7:58am	4:08pm	490	45	2.19E+07	3/31/2005	57	12	1.5	2.84E-14	4/4/2005	10	12	0	0.00E+00	0.00%
16023ST	3/30/2005	7:53am	4:10pm	497	40	1.97E+07	3/31/2005	61	12	1.63333	3.43E-14	4/4/2005	11	12	0	0.00E+00	0.00%
16023SB	3/30/2005	7:50am	4:12pm	502	42	2.09E+07	3/31/2005	89	12	2.56667	5.08E-14	4/4/2005	13	12	0.033	6.60E-16	16.49%
16023E	3/30/2005	7:57am	4:16pm	499	42	2.08E+07	3/31/2005	72	12	2	3.98E-14	4/4/2005	14	12	0.067	1.33E-15	33.19%
16024N	3/31/2005	7:51am	4:14pm	503	42	2.09E+07	4/1/2005	60	11	1.63333	3.23E-14	4/5/2005	9	10	0	0.00E+00	0.00%
16024ST	3/31/2005	7:48am	4:18pm	510	44	2.22E+07	4/1/2005	55	11	1.46667	2.73E-14	4/5/2005	11	10	0.033	6.20E-16	15.50%
16024SB	3/31/2005	7:46am	4:20pm	514	40	2.04E+07	4/1/2005	41	11	1	2.03E-14	4/5/2005	10	10	0	0.00E+00	0.00%
16024E	3/31/2005	7:52am	4:12pm	500	45	2.23E+07	4/1/2005	32	11	0.7	1.30E-14	4/5/2005	12	10	0.067	1.24E-15	30.91%
16025N	4/1/2005	7:51am	3:29pm	453	45	2.02E+07	4/4/2005	14	12	0.06667	1.36E-15	4/6/2005	10	11	0	0.00E+00	0.00%
16025ST	4/1/2005	7:57am	3:18pm	441	45	1.97E+07	4/4/2005	11	12	0	0.00E+00	4/6/2005	9	11	0	0.00E+00	0.00%
16025SB	4/1/2005	7:54am	3:21pm	447	44	1.95E+07	4/4/2005	12	12	0	0.00E+00	4/6/2005	12	11	0.033	7.07E-16	17.68%
16025E	4/1/2005	7:50am	3:26pm	456	44	1.99E+07	4/4/2005	15	12	0.1	2.08E-15	4/6/2005	11	11	0	0.00E+00	0.00%

Note: Air samples collected on 3/29/05 were not analyzed until 3/31/05 (Day-After Count). Glenn Huber was not onsite on 3/30/05 to perform analysis. Joel Ahrweiler (SAHCI HP Technician) collected air samples that day.

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor **Report #1 2/21/05 - 2/25/05** **(High Volume)**

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/21/2005	519	0.00E+00	0.00E+00	
2/22/2005	536	0.00E+00	0.00E+00	
2/23/2005	501	0.00E+00	0.00E+00	
2/24/2005	491	1.21E-15	5.94E-13	
2/25/2005	480	0.00E+00	0.00E+00	
	2527	1.21E-15	5.94E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (North) = 2.35E-16 uCi/ml

Percentage of Release Limit of = 5.88%
4E-15uCi/ml

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/21/2005	532	0.00E+00	0.00E+00	
2/22/2005	548	0.00E+00	0.00E+00	
2/23/2005	520	5.82E-16	3.03E-13	
2/24/2005	492	0.00E+00	0.00E+00	
2/25/2005	492	1.26E-15	6.20E-13	
	2584	1.84E-15	9.23E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (South) = 3.57E-16 uCi/ml

Percentage of Release Limit of = 8.93%
4E-15uCi/ml

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/21/2005	528	6.43E-16	3.40E-13	
2/22/2005	552	0.00E+00	0.00E+00	
2/23/2005	523	0.00E+00	0.00E+00	
2/24/2005	495	0.00E+00	0.00E+00	
2/25/2005	494	0.00E+00	0.00E+00	
	2592	6.43E-16	3.40E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (East) = 1.31E-16 uCi/ml

Percentage of Release Limit of = 3.27%
4E-15uCi/ml

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/21/2005	522	0.00E+00	0.00E+00	
2/22/2005	540	0.00E+00	0.00E+00	
2/23/2005	500	0.00E+00	0.00E+00	
2/24/2005	494	6.40E-16	3.16E-13	
2/25/2005	482	0.00E+00	0.00E+00	
	2538	6.40E-16	3.16E-13	

$$C_{avg} = \frac{\Sigma T_s \cdot C_i}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly	
Effluent Concentration (West) =	**1.25E-16 uCi/ml**
Percentage of Release Limit of =	*3.11%*

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor **Report #2 2/28/05 - 3/4/05** (High Volume)

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/28/2005	398	0.00E+00	0.00E+00	
3/1/2005	471	0.00E+00	0.00E+00	
3/2/2005	501	0.00E+00	0.00E+00	
3/3/2005	485	0.00E+00	0.00E+00	
3/4/2005	441	0.00E+00	0.00E+00	
	2296	0.00E+00	0.00E+00	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (North) = 0.00E+00 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 0.00%

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/28/2005	396	7.64E-16	3.03E-13	
3/1/2005	470	0.00E+00	0.00E+00	
3/2/2005	502	0.00E+00	0.00E+00	
3/3/2005	483	6.70E-16	3.24E-13	
3/4/2005	0	0.00E+00	0.00E+00	No Sample Collected
	1851	1.43E-15	6.26E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (South) = 3.38E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 8.46%

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/28/2005	399	0.00E+00	0.00E+00	
3/1/2005	473	0.00E+00	0.00E+00	
3/2/2005	505	0.00E+00	0.00E+00	
3/3/2005	486	0.00E+00	0.00E+00	
3/4/2005	445	0.00E+00	0.00E+00	
	2308	0.00E+00	0.00E+00	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (East) = 0.00E+00 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 0.00%

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
2/28/2005	402	0.00E+00	0.00E+00	
3/1/2005	474	0.00E+00	0.00E+00	
3/2/2005	504	6.42E-16	3.24E-13	
3/3/2005	487	0.00E+00	0.00E+00	
3/4/2005	443	0.00E+00	0.00E+00	
	2310	6.42E-16	3.24E-13	

$$C_{avj} = \frac{\Sigma T_{sj} C_j}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (West) = 1.40E-16 uCi/ml

Percentage of Release Limit of = 3.50%

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor Report #3 3/7/05 - 3/11/05 (High Volume)

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/7/2005	484	0.00E+00	0.00E+00	
3/8/2005	0	0.00E+00	0.00E+00	No Demolition
3/9/2005	0	0.00E+00	0.00E+00	No Demolition
3/10/2005	0	0.00E+00	0.00E+00	No Demolition
3/11/2005	0	0.00E+00	0.00E+00	No Demolition
	484	0.00E+00	0.00E+00	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (North) = 0.00E+00 uCi/ml

Percentage of Release Limit of = 0.00%
4E-15uCi/ml

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/7/2005	493	0.00E+00	0.00E+00	
3/8/2005	0	0.00E+00	0.00E+00	No Demolition
3/9/2005	0	0.00E+00	0.00E+00	No Demolition
3/10/2005	0	0.00E+00	0.00E+00	No Demolition
3/11/2005	0	0.00E+00	0.00E+00	No Demolition
	493	0.00E+00	0.00E+00	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (South) = 0.00E+00 uCi/ml

Percentage of Release Limit of = 0.00%
4E-15uCi/ml

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/7/2005	496	6.37E-16	3.16E-13	
3/8/2005	0	0.00E+00	0.00E+00	No Demolition
3/9/2005	0	0.00E+00	0.00E+00	No Demolition
3/10/2005	0	0.00E+00	0.00E+00	No Demolition
3/11/2005	0	0.00E+00	0.00E+00	No Demolition
	496	6.37E-16	3.16E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (East) = 6.37E-16 uCi/ml

Percentage of Release Limit of = 15.93%
4E-15uCi/ml

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/7/2005	487	0.00E+00	0.00E+00	
3/8/2005	0	0.00E+00	0.00E+00	No Demolition
3/9/2005	0	0.00E+00	0.00E+00	No Demolition
3/10/2005	0	0.00E+00	0.00E+00	No Demolition
3/11/2005	0	0.00E+00	0.00E+00	No Demolition
	487	0.00E+00	0.00E+00	

$$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (West) = 0.00E+00 uCi/ml

Percentage of Release Limit of = 0.00%

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor **Report #4 3/14/05 - 3/18/05** (High Volume)

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/14/2005	527	0.00E+00	0.00E+00	
3/15/2005	505	6.56E-16	3.31E-13	
3/16/2005	508	0.00E+00	0.00E+00	
3/17/2005	487	6.35E-16	3.09E-13	
3/18/2005	444	0.00E+00	0.00E+00	
	2471	1.29E-15	6.41E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (North) = 2.59E-16 uCi/ml

Percentage of Release Limit of = 6.48%
4E-15uCi/ml

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/14/2005	524	0.00E+00	0.00E+00	
3/15/2005	510	0.00E+00	0.00E+00	
3/16/2005	509	0.00E+00	0.00E+00	
3/17/2005	489	0.00E+00	0.00E+00	
3/18/2005	448	0.00E+00	0.00E+00	
	2480	0.00E+00	0.00E+00	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (South) = 0.00E+00 uCi/ml

Percentage of Release Limit of = 0.00%
4E-15uCi/ml

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/14/2005	528	5.99E-16	3.16E-13	
3/15/2005	510	0.00E+00	0.00E+00	
3/16/2005	514	1.29E-15	6.63E-13	
3/17/2005	493	0.00E+00	0.00E+00	
3/18/2005	447	1.52E-15	6.79E-13	
	2492	3.41E-15	1.66E-12	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (East) = 6.66E-16 uCi/ml

Percentage of Release Limit of = 16.64%
4E-15uCi/ml

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/14/2005	530	0.00E+00	0.00E+00	
3/15/2005	509	5.94E-16	3.02E-13	
3/16/2005	511	6.48E-16	3.31E-13	
3/17/2005	490	0.00E+00	0.00E+00	
3/18/2005	448	0.00E+00	0.00E+00	
	2488	1.24E-15	6.33E-13	

$$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (West) = 2.55E-16 uCi/ml

Percentage of Release Limit of = 6.37%

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor Report #5 3/21/05 - 3/25/05 **(High Volume)**

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/21/2005	511	0.00E+00	0.00E+00	
3/22/2005	513	0.00E+00	0.00E+00	
3/23/2005	503	1.32E-15	6.64E-13	
3/24/2005	489	0.00E+00	0.00E+00	
3/25/2005	0	0.00E+00	0.00E+00	No Air Monitoring = Weather
	2016	1.32E-15	6.64E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (North) = 3.29E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 8.23%

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/21/2005	508	0.00E+00	0.00E+00	
3/22/2005	495	1.25E-15	6.19E-13	
3/23/2005	502	0.00E+00	0.00E+00	
3/24/2005	503	0.00E+00	0.00E+00	
3/25/2005	0	0.00E+00	0.00E+00	No Air Monitoring = Weather
	2008	1.25E-15	6.19E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (South) = 3.08E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 7.70%

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/21/2005	513	0.00E+00	0.00E+00	
3/22/2005	501	1.26E-15	6.31E-13	
3/23/2005	507	6.10E-16	3.09E-13	
3/24/2005	500	6.62E-16	3.31E-13	
3/25/2005	0	0.00E+00	0.00E+00	No Air Monitoring = Weather
	2021	2.53E-15	1.27E-12	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (East) = 6.29E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 15.73%

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/21/2005	511	0.00E+00	0.00E+00	
3/22/2005	515	0.00E+00	0.00E+00	
3/23/2005	506	0.00E+00	0.00E+00	
3/24/2005	491	0.00E+00	0.00E+00	
3/25/2005	0	0.00E+00	0.00E+00	No Air Monitoring = Weather
	2023	0.00E+00	0.00E+00	

$$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly
Effluent Concentration (West) = 0.00E+00 uCi/ml

Percentage of Release Limit of = 0.00%

Area Air Monitoring Summary Sheet - Weekly Effluent Concentration Report

160 E. Illinois St. - Building Demolition *Chicago, IL*

North Monitor **Report #6 3/28/05 - 4/1/05** (High Volume)

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/28/2005	506	6.16E-16	3.12E-13	
3/29/2005	502	0.00E+00	0.00E+00	
3/30/2005	490	0.00E+00	0.00E+00	
3/31/2005	503	0.00E+00	0.00E+00	
4/1/2005	453	0.00E+00	0.00E+00	
	2454	6.16E-16	3.12E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (North) = 1.27E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 3.18%

South (Top) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/28/2005	494	0.00E+00	0.00E+00	
3/29/2005	489	0.00E+00	0.00E+00	
3/30/2005	497	0.00E+00	0.00E+00	
3/31/2005	510	6.20E-16	3.16E-13	
4/1/2005	441	0.00E+00	0.00E+00	
	2431	6.20E-16	3.16E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (South) = 1.30E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 3.25%

South (Bottom) Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/28/2005	500	0.00E+00	0.00E+00	
3/29/2005	495	0.00E+00	0.00E+00	
3/30/2005	502	6.60E-16	3.31E-13	
3/31/2005	514	0.00E+00	0.00E+00	
4/1/2005	447	7.07E-16	3.16E-13	
	2458	1.37E-15	6.47E-13	

$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$

Eq A.9 NUREG 1400

Time Weighted Weekly Effluent Concentration (East) = 2.63E-16 uCi/ml

Percentage of Release Limit of 4E-15uCi/ml = 6.58%

East Monitor

Date	Time Sampled (minutes)	Effluent Concentration in uCi/ml	Concentration x Sample Min / Day	Comments
3/28/2005	506	6.71E-16	3.40E-13	
3/29/2005	504	0.00E+00	0.00E+00	
3/30/2005	499	1.33E-15	6.64E-13	
3/31/2005	500	1.24E-15	6.20E-13	
4/1/2005	456	0.00E+00	0.00E+00	
	2465	3.24E-15	1.62E-12	

$$C_{avg} = \frac{\Sigma T_{s,i} C_i}{\Sigma T_s}$$

Eq A.9 NUREG 1400

Time Weighted Weekly	
Effluent Concentration (West) =	**6.58E-16 uCi/ml**
Percentage of Release Limit of =	*16.46%*

Minimum Detectable Concentration Calculation

Staplex TFIA High Volume Air Samples analyzed on Ludlum 43-10 Alpha Counter

$$MDC = \frac{2.71}{n E F K T_s T_g cf} + \frac{3.29\sqrt{R_b\left[\frac{1}{T_b} + \frac{1}{T_g}\right]}}{n E F K T_s cf}$$

NUREG 1400 *Air Sampling in the Workplace* Appendix A (eq A.17)

n = number of sampling intervals
E = fractional filter efficiency
F = airlow rate through the sampler in cm^3 / min
K= counting efficiency in cpm /µCi
T_s= duration of sample collection in min
T_g = gross counting time
T_b = background counting time
R_n = net count rate in cpm
R_b = background count rate in cpm
C = concentration of radioactive material in the air in µCi/cm^3
Cf = count vs sample conversion "this is not part of NUREG 1400, however analysis volume must be taken into account

n = 5 days of sampling minimum per week
E= 0.7 (referred to as filter retention factor on air sampling form)
F= 1.13 x 10^6 cm^3/min (or ml/min)
40ft^3/min x 28.316 liters/ft^3 x 1000ml/l = 1.13 x 10^6 ml/min
K=699300
0.315 count / disintegration x 2.22 x10^6 dis/µCi = 699300 cpm/µCi
T_s= 480 min
Based on a minimum of 8 hours per day
T_g= 30 min
T_b= 600 min
Cf = 0.035
8"x 10" original filter size = 80 $inches^2$
0.3 inch border is covered by sampler plate and not sampled = 10.8 $inches^2$
filter cutout = πr^2 = $(0.875")^2(3.14)$ = 2.41 inches"
actual sample area = 80 $inches^2$ – 10.8 $inches^2$ = 69.2 $inches^2$
sample analyzed vs. sample collected ratio = 2.41 / 69.2 = 0.035
r_b = 0.58 cpm , based on 600 min background count on 4/10-4/11/00

$$MDC = \frac{2.71}{(5)(0.7)(1.13E6)(699300)(0.035)(480)(30)} + \frac{3.29\sqrt{(0.58)\left[\frac{1}{(600)} + \frac{1}{(30)}\right]}}{(2.24)(0.7)(1.13E6)(699300)(0.035)(480)(30)}$$

= 2.69 x10^{-15} µCi/ ml (gross alpha weekly MDC)
= 5.39 x10^{-16} µCi/ ml (gross alpha ÷ 5, for Th-232)

Both MDC's are below the most limiting effluent release criteria, specified in Kerr McGee Air Monitoring Procedure SOP-212 (Th-232 = 4 x10^{-15} µCi/ml)